# TRAINING MANUAL

## LCD Directview Television - 2006



Published February 2006 by LG Education & Product Engineering
Customer Service (and Part Sales): 1-800-243-0000
Technical Support (and Part Sales): 1-800-847-7597
USA Website: www.lgusa.com
Customer Service Website: us.lgservice.com
B2B Service Website: aic.lgservice.com
Training Website: www.LGCSAcademy.com

**IMPORTANT SAFETY NOTICE**

This manual was prepared for use only by properly trained audio-visual service technicians. When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Electronics. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury. All components should be replaced only with types identical to those in the original circuit and their physical location, wiring, and lead dress must conform to original layout upon completion of repairs. If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it only with the factory specified fuse type and rating. When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1W), keep the resistor 10mm away from PCB. Always keep wires away from high voltage or high temperature parts. Do not attempt to modify this product in any way.

Special components are also used to prevent shock and fire hazard and are required to maintain safe performance. No deviations are allowed without prior approval by LG Electronics. Service work should be performed only after you are thoroughly familiar with these safety checks and servicing guidelines. Circuit diagrams may occasionally differ from the actual circuit used. This way, implementation of the latest safety and performance improvement changes into the set is not delayed until the new service literature is printed.

**GENERAL SAFETY GUIDANCE**

An lsolation Transformer should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating to protect against personal injury from electrical shocks. It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation. Before returning the receiver to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc. If the exposed metallic part has a return path to the chassis, the measured resistance should be between 1MΩ and 5.2MΩ. When the exposed metal has no return path to the chassis the reading must be infinite. Any other abnormality that exists must be corrected before the receiver is returned to the customer.

**ELECTROSTATICALLY SENSITIVE DEVICES**

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on the body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as an ESD mat, to prevent electrostatic charge buildup or exposure of the assembly. Use only a grounded-tip soldering iron to solder or unsolder ES devices. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices. Do not use freon-propelled chemicals which can generate electrical charge sufficient to damage ES devices. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. Minimize bodily motions when handling unpackaged replacement ES devices (Otherwise, seemingly harmless motion, such as the brushing together of your clothing or the lifting of your foot from a carpeted floor, can generate static electricity sufficient to damage an ES device).

**REGULATORY INFORMATION**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and receiver; Connect the equipment into an outlet on a circuit different from that to which the receiver is connected; Consult the dealer or an experienced radio/TV technician for help.

The responsible party for this device's compliance is:

LG Electronics of Alabama, Inc.
201 James Record Road
Huntsville, AL 35824, USA
Digital TV Hotline: 1-800-243-0000

# TABLE OF CONTENTS

# OVERVIEW

## INTRODUCTION



All LCD TV models are module level repair in and out of warranty. They are covered by a one year parts and labor warranty. For service, the end user should call 1-800-243-0000 for complete shipping and handling instructions. Refer to the last page of the owner's manual for more warranty information. For models under 30", the Sevice Level is Factory Service Repair. Larger models are Field Service. Although, warranty repair by an ASC is approved in certain situations for smaller screen models. Contact the LG Warranty department for more information.

Most models are similiar in function and internal layout with the exception of models over 23". For example, the 30" inch LCD has more fluorescent lamps than normal (16 lamps) and some additional user functions.

Note that not all models support HDTV (High Definiton Television). The 10", 13", and 20" models do not support HDTV, but 20" models do support EDTV (Enhanced Definiton Television). The section on Models has more information about the specifications of each model.

## MOUNTING INTERFACE

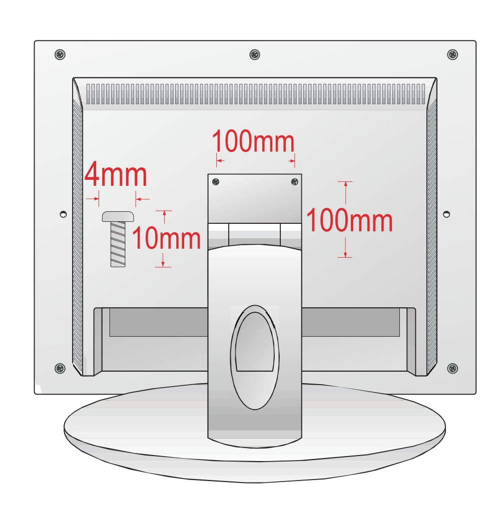
The Video Electronics Standards Association (VESA) Flat Display Mounting Interface Standard (FDMI) outlines mounting interface standards for flat-panel displays. VESA FDMI Standards are 75 x 75 mm, 100 x 100 mm, and 100 x 200 mm mounting hole pattern with 4, 4 mm x 10 mm screws. Most new models feature a VESA mount, except large screen models. Large screen models use mounting hole patterns similar to PDPs.

**75MM MOUNT**
10" Models

**100MM MOUNT**
13" to 23"

**200MM MOUNT**
26" to 32" Models

**NO VESA MOUNT**
37, 42, & 55" models



## COMPUTER CONNECTION

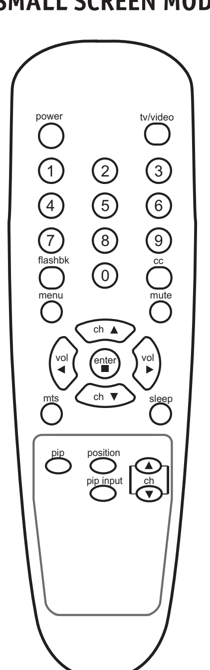
Most models except the 10”, 13”, and 20” support computer video. Set the monitor output resolution and vertical frequency on the PC before connecting to the TV (see table). Connect the TV to the computer with a VGA cable. Connect the computer’s audio output to the TV’s PC SOUND input.

The TV has been pre-adjusted to use XGA 1024x768, 60Hz format. If possible, use one of the XGA formats to obtain the best image quality for your TV/LCD monitor. LCD monitors should be used at their native (normally their max) resolution. If set up under other resolutions, a slightly distorted picture may appear on the screen. If the message “OUT OF RANGE” appears on the screen, adjust the PC output to a format listed in the chart.

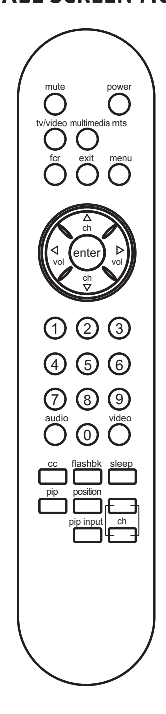
| Computer Video Modes | | | |
|---|---|---|---|
| Mode | Resolution | Horizontal Frequency (KHz) | Vertical Frequency (KHz) |
| VGA | 640x400 | 31.5KHz | 70Hz |
| | 640x400 | 37.9KHz | 85Hz |
| | 640x480 | 31.5KHz | 60Hz |
| | 640x480 | 35.0KHz | 67Hz |
| | 640x480 | 37.9KHz | 72Hz |
| | 640x480 | 37.5KHz | 75Hz |
| | 640x480 | 43.3KHz | 85Hz |
| | 720x400 | 31.5KHz | 70Hz |
| SVGA | 800x600 | 35.2KHz | 56Hz |
| | 800x600 | 37.9KHz | 60Hz |
| | 800x600 | 48.1KHz | 72Hz |
| | 800x600 | 46.9KHz | 75Hz |
| | 800x600 | 53.7KHz | 85Hz |
| (MAC) | 832x624 | 49.7KHz | 75Hz |
| XGA | 1024x768 | 48.4KHz | 60Hz |
| | 1024x768 | 56.5KHz | 70Hz |
| | 1024x768 | 60.2KHz | 75Hz |
| | 1024x768 | 68.67KHz | 85Hz |

## REMOTES

**2001/2002**
**SMALL SCREEN MODELS**

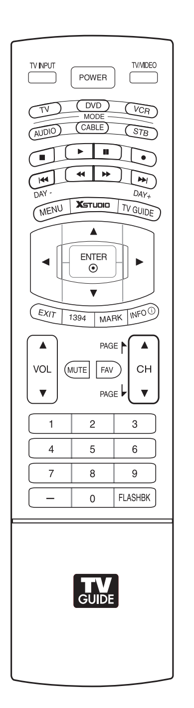



**2003+**
**SMALL SCREEN MODELS**




**30” LCD STYLE REMOTE**

**2005+**
**LARGE SCREEN MODELS**



# TERMINOLOGY

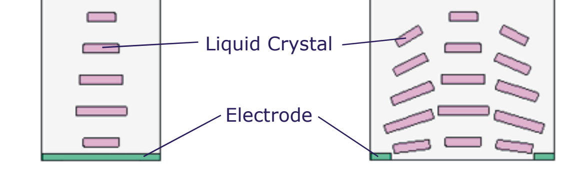
This section explains some of the terminology used with LCD TVs.

## VIEWING ANGLE

Viewing angle is the angle at which the display's brightness begins to noticeably diminish. Viewing angle used to be a major factor when choosing an LCD but they have improved enough on current models that it is not an issue anymore. This is due to advancements like In-Plane Switching, High-efficiency Backlights, and reflective Polarizers. Some smaller screen LCDs (under 15") may still have limited viewing angles to keep costs down.

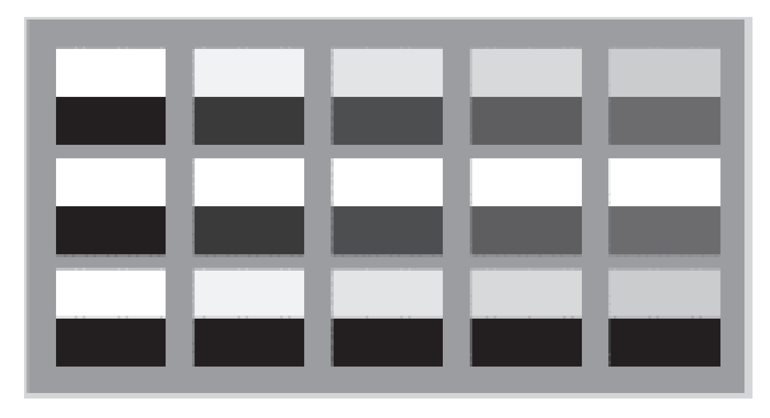
## IPS (IN-PLANE SWITCHING)

In-Plane Switching provides more control over the Liquid Crystals in an LCD. It uses an electric field to line up the Liquid Crystals in an arc formation. This directs light out at angles which improves the viewing angle.




## PEAK BRIGHTNESS

Peak brightness is the maximum amount of brightness that a display can produce. It is often measured in candella per square meter (cd/m2). Most LG and Zenith LCDs are 400-450 cd/m2.



## CONTRAST RATIO

Contrast Ratio is the ratio of a display's brightest white to its darkest black. Higher Contrast Ratios are better and will allow a TV to reproduce a more realistic picture and make text easier to read. One of the limitations of LCDs has been contrast ratio. With recent improvements, our LCD TVs have a contrast ratio up to 450:1.

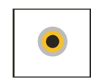
## RESPONSE TIME

The speed at which the pixels can react or change. Slower response times can cause fast moving video to "ghost" or distort because the scene changes faster than the LCD can display the video (especially with video games). Response times of new LCDs isn't a factor for most uses, but older models could experience noticable ghosting due to slower response times.

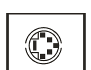
# TERMINOLOGY

## A/V CONNECTIONS

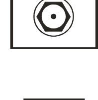
Below are connections you may find on LCD TVs. SD = Standard Definition and HD = High Definition.



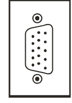
### Composite
Normally labeled "Composite" and/or "Video". SD Only.



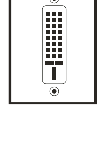
### S-Video
Super Video. Normally labeled "S-Video". SD Only. A little better quality than Composite.



### Antenna
Normally labeled "Antenna". Supports HD. A.k.a. Coax, Cable.

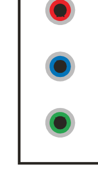


### VGA
Normally labeled "RGB" and/or "PC/DTV". Supports HD.

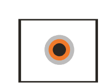


### DVI
Normally labeled "DVI", "PC/DTV", or "HDMI". Digital instead of analog (Digital version of VGA). Supports HD.

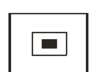
### HDMI
Normally labeled "HDMI". Newer version of DVI. Supports HD and Digital Audio.



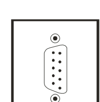
### Component Video
Normally labeled "Component/ DTV/DVD". Supports HD.



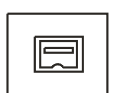
### Digital Audio
Normally labeled "Digital Audio (coaxial)". Better quality then normal audio. Supports Surround Sound.



### Optical Audio
Normally labeled "Digital Audio (optical)". Better quality then normal audio. Supports Surround Sound. Uses a fiber optic cable.



### RS-232
Normally labeled "Calibration Port", "Service Port", and/or "RS-232". A.k.a. serial port. Used for uploading firmware or external control of the unit (no video or audio).



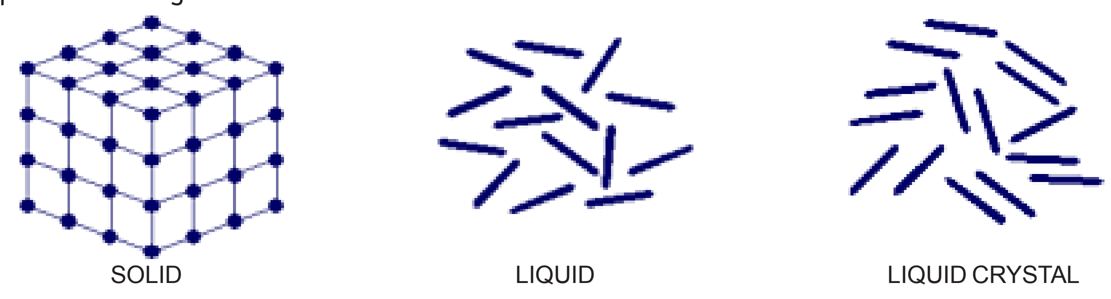
### IEEE 1394
Normally labeled "IEEE 1394" or "DTV Link". Supports HD and Digital Audio.

# THEORY

This section covers what Liquid Crystals are and how an LCD Display works.

## LIQUID CRYSTALS

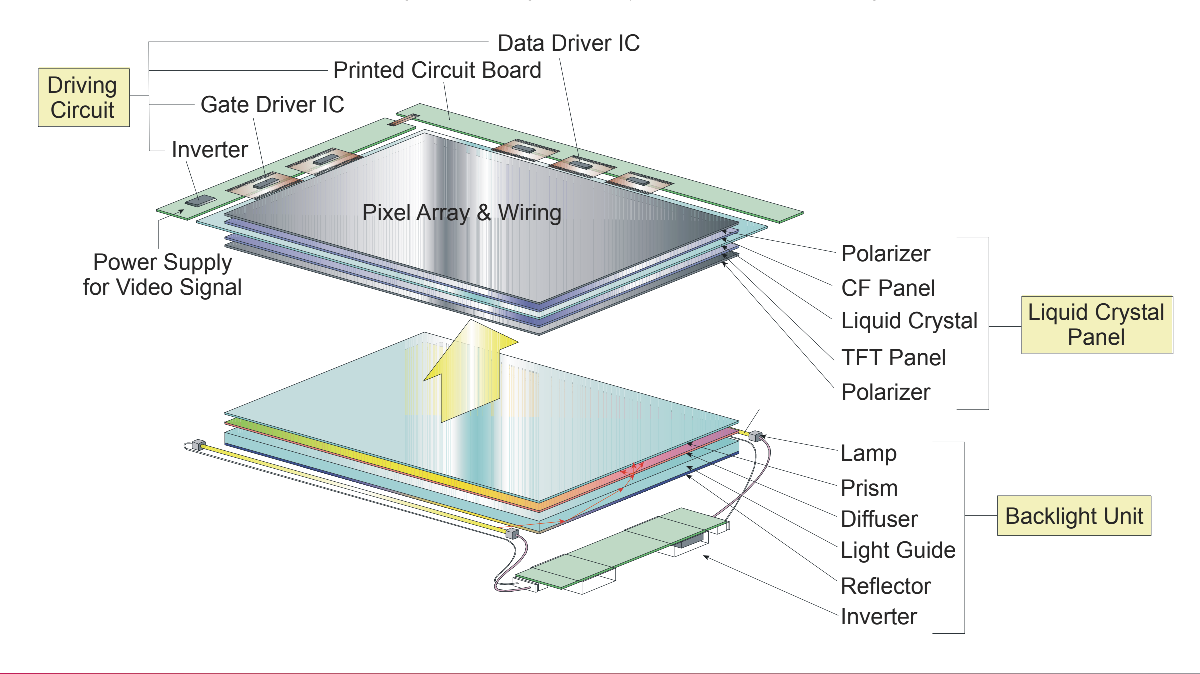
In school you learned that matter has three distinct states; solid, liquid, and gas. However, there are states of matter that may fall between these states, like liquid crystals. Basically they are crystals that hold their orientation (shape) but can flow similar to liquids. Their molecules point in same direction with respect to each other like in a solid, but they are free to change position like in a liquid. Think of a handful of pencils. They collectively hold their shape at rest, but change shape when you squeeze or let go of them.



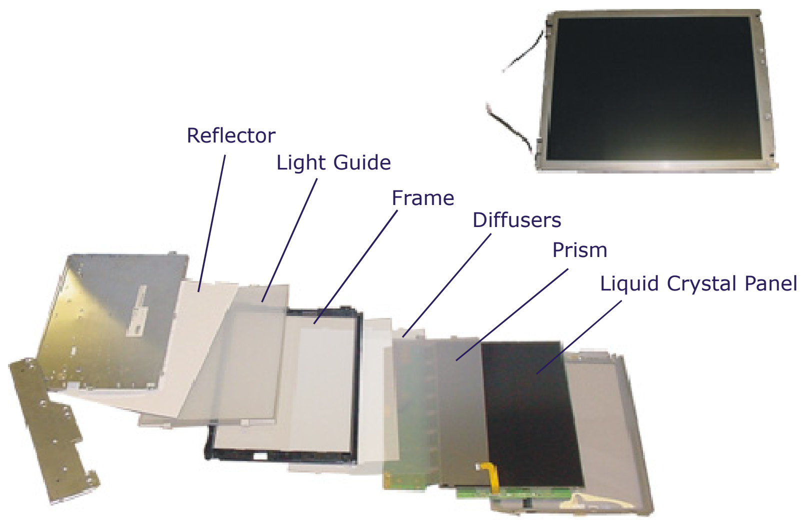

There are different phases and types of liquid crystals that perform differently. Small amounts of pressure, heat, and/or electricity can cause liquid crystals to change in some way. For LCDs we are interested in the electricity aspect, but pressure and heat are side effects that have to be dealt with. This is why LCDs have a  limited operating range and distort when you press on the screen.

## LIQUID CRYSTAL DISPLAY

A Liquid Crystal Display is composed of a light source (backlight), a Liquid Crystal Panel, and a driving circuit. We start with a light source at the back of the panel composed of thin fluorescent bulbs (CCFLs - Cold Cathode Flouresent Lamps). This light passes through filters to help create a uniform light source. Then the light passes through the Liquid Crystal Panel which is composed of thousands of pixels that control the flow of light throught the panel to make images.

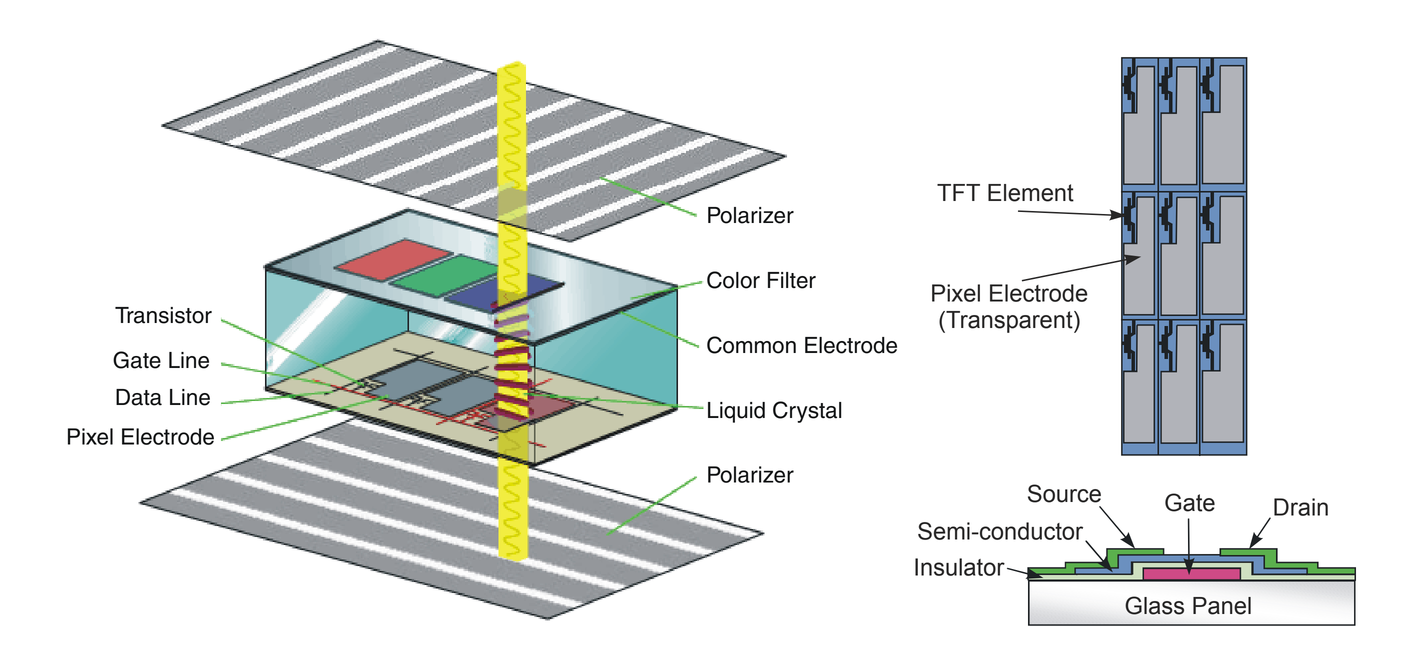


An LCD panel from a 15" LCD TV.




## LIQUID CRYSTAL PANEL

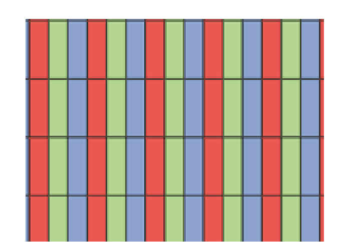
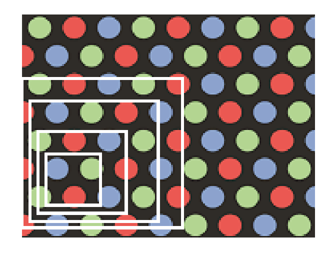
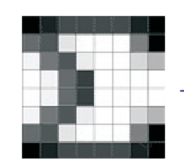
Below (on the left) is a cross section of a liquid crystal panel. The key to an LCD's operation is the polarizers. The polarizers only allow a certain wavelength of light to pass through. The two polarizers are mounted at a 90 degree angle with respect to each other, which prevents light from passing through. The liquid crystals are used to twist the light beam 90 degrees and allow light to pass through that cell. Color comes from a simple light filter.



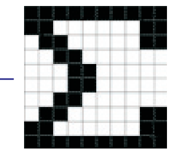

Each sub-pixel or cell (a red, green, and blue sub-pixel equals one pixel) is controlled by a Thin Film Transistor (TFT). This provides accurate control of each cell and makes for an accurate picture. Some methods used in the past that didn't involve a switch and current could leak to surrounding cells resulting in a blurred image. A TFT is a semiconductor (bottom-right picture), it behaves like a relay switch.

## LCD VERSUS CRT

One disatvantage LCDs have is having fixed pixels which makes it more difficult to scale video than a CRT. A CRT can change the pixel size by adjusting the size of the beam, LCDs use a processor called a Scalar. LCDs feature their best picture quality at their native resolution (or max res) and CRTs feature good quality at any resolution up to their maximum resolution.

Scaled video example





**LCD ADVANTAGES OVER CRT**

Uses less power

Less heat ouput

Smaller and lighter

Unaffected by Magnetic Fields



**CRT ADVANTAGES OVER LCD**

Better scaling

Less expensive

## LCD VERSUS PLASMA



**LCD ADVANTAGES OVER PLASMA**

Uses less power

Smaller and lighter

Replaceable backlight



**PLASMA ADVANTAGES OVER LCD**

Less expensive (for same screen size)

Brighter

Better contrast

## MODEL OVERVIEW

This section covers some of the past and present LG and Zenith LCD TVs. Most LCD TVs feature similar features and specifications. They support High Definition and computer input, except for the 10", 13", 20", and the wireless 15" models. The 2005 models 26" and larger have built-in ATSC tuners and support CableCARDTM. Note that Commerical models don't have CableCARDTM support since it is not needed in a distribution network.

*KEY TERMS*

*SDTV - Standard Definition (480i).*

*EDTV - Enhanced Definition (480p).*

*HDTV - High Definition (720p, 1080i).*

*XD Engine™ - Six distinct processes contribute to picture improvement.*

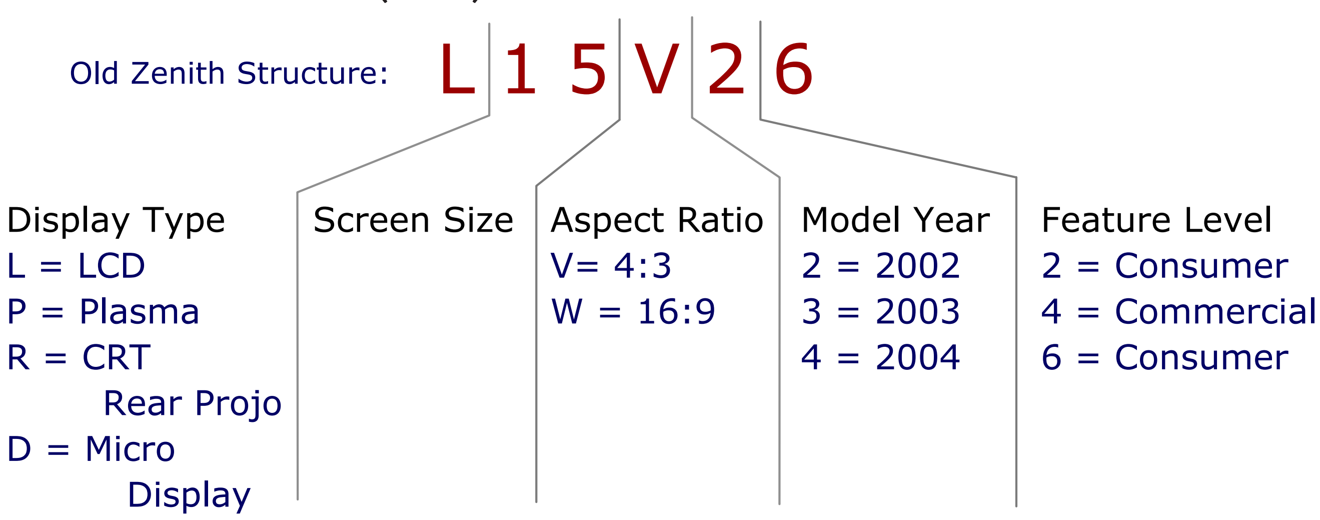
*CableCARDTM - Decoder card for digital cable.*

*HDMI - High Definition Multimedia Interface. Alternative to DVI. Smaller connector and supports audio.*

*HDCP - High-bandwidth Digital Content Protection.*

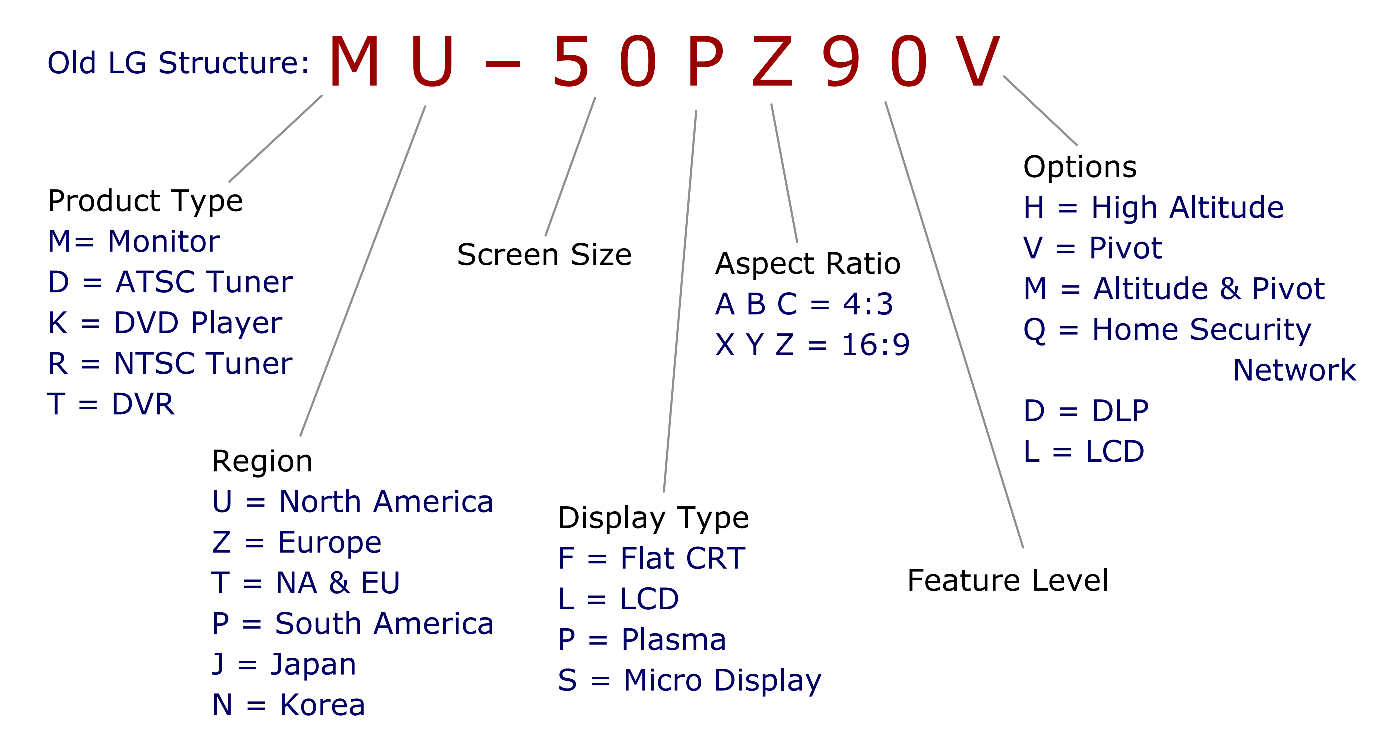
### MODEL NUMBERS

**OLDER ZENITH PRODUCTS (02-04)**



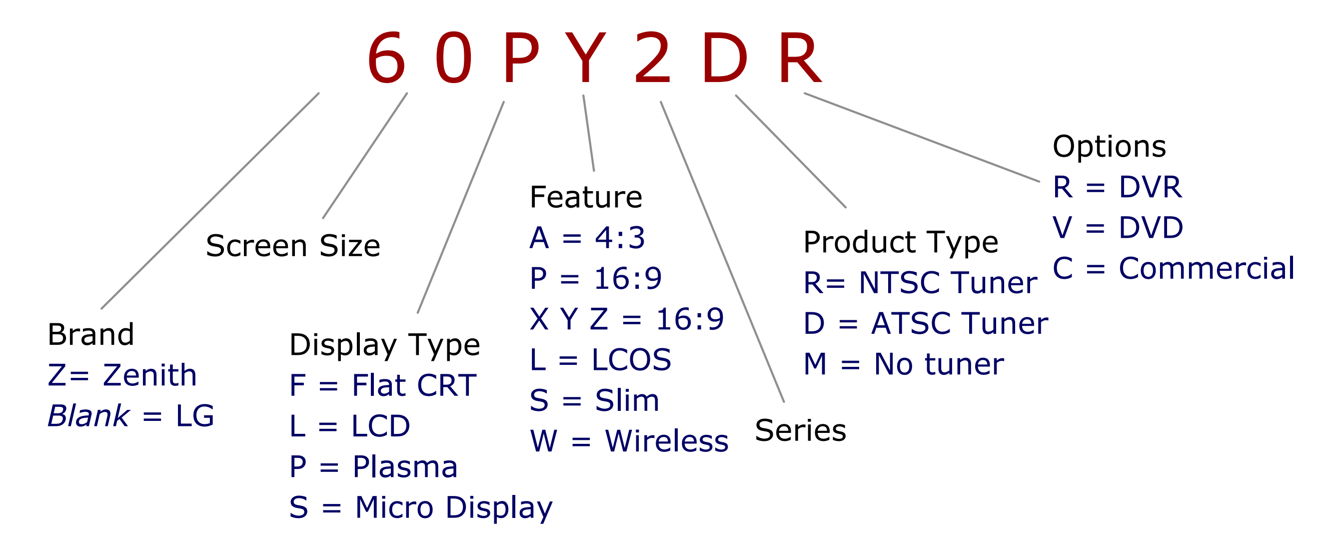
# MODELS

## OLDER LG PRODUCTS

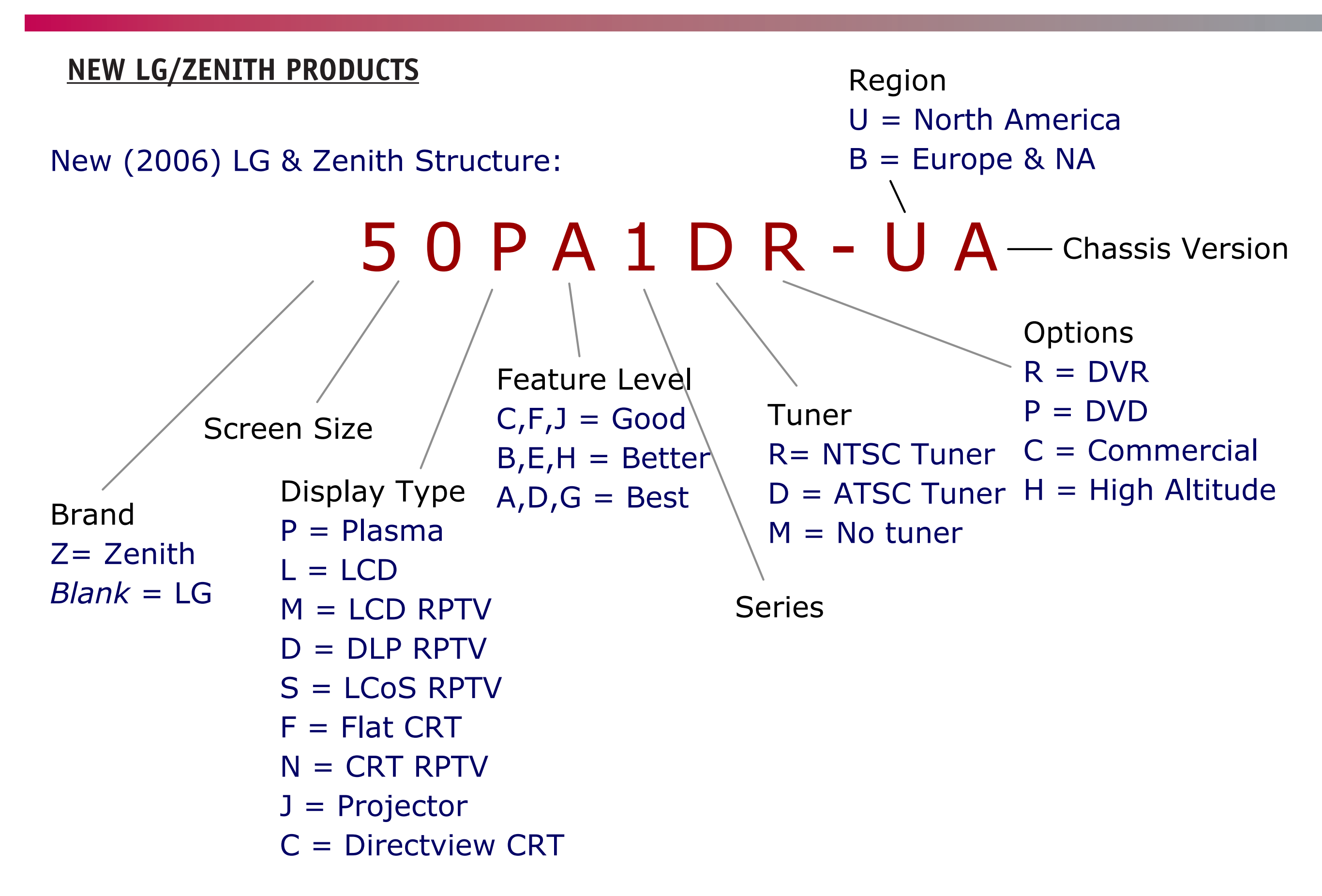



## CURRENT LG/ZENITH PRODUCTS

Current (2005) LG & Zenith Structure:



## NEW LG/ZENITH PRODUCTS




## MODEL NUMBER OVERVIEW

The exception to the model rules on the previous pages are the ZLD models and a couple of special commercial models. The ZLD models are our original/oldest LCD TVs and there are two 15" models and one 20" model that use this nomenclature.

You should now be able to determine the approximate age of an LCD TV by its model number. Below is an example using 15” LCD TVs.

New Models (2006): 15LC1R

Current models (2005): 15LA6R and Z15LA7R

Older models (2003-2004): RU-15LA61 and L15V36

Older models (2002-2003): L15V26

Original Model (1999-2002): ZLD15A1

# MODELS

## MODEL DESCRIPTIONS

### 10" MODELS

The 10” models do not support HDTV and don't support computer input like most LCDs. The new V34 models are commercial models. They feature an MPI/RF card like some of the CRT commercial sets and also offer an optional RS-232 add-on card. The V22 has component inputs, but the V34 does not.



ZENITH L10V22
Brightness - 200 cd/m2
Contrast Ratio - 250:1
Viewing Angle - 90° x 90°



ZENITH L10V34H
ZENITH L10V34S
Brightness - 350 cd/m2
Contrast Ratio - 180:1
Viewing Angle - 120° x 95°

### 13" MODELS

The L13V36 is an standard definition TV and has a resolution of 640x480 and features the new brighter LCD panel technology. It accepts component input but does not accept computer input.

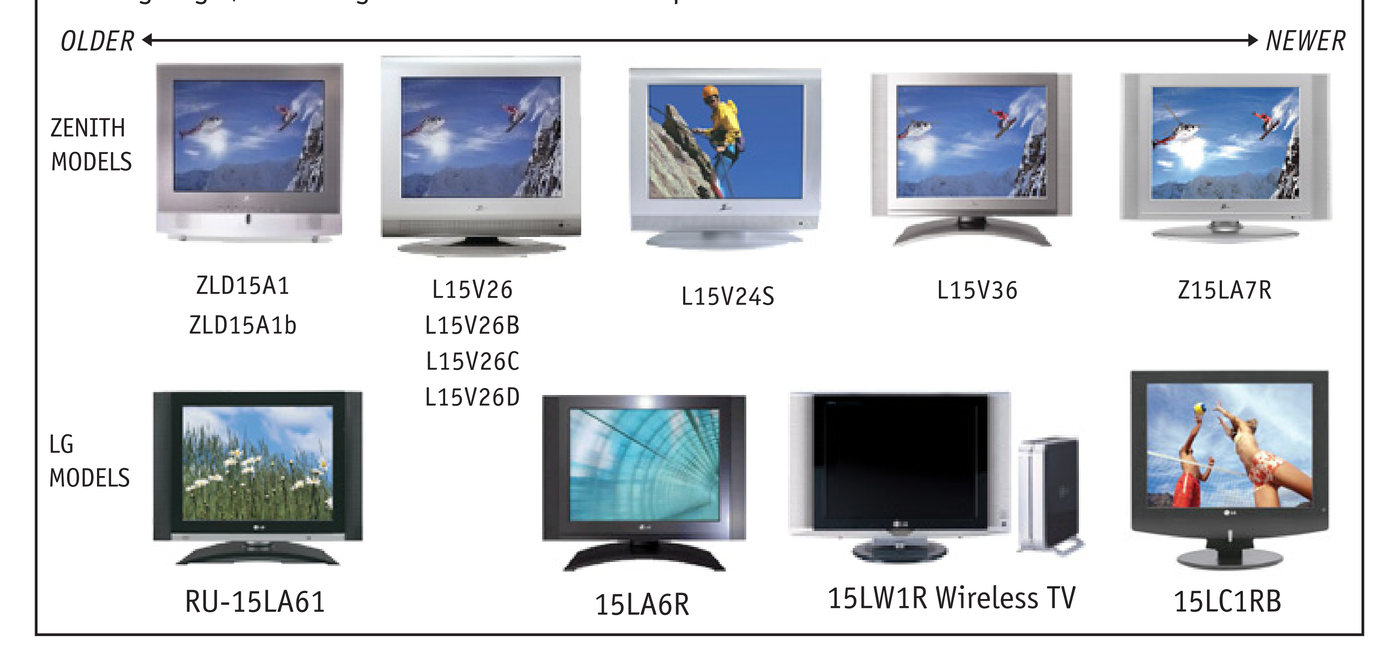


ZENITH L13V36
LG RU-13LA60
Type - SDTV
Resolution - 640 x 480
Viewing Angle - 140° x 120°

### 15" MODELS

All 15" models support HDTV, computer input (VGA), and have the basic features that a normal TV would have (e.g. v-chip, stereo, trilingual menus, on/off timer, closed captions). They have a built-in NTSC tuner but no ATSC tuner. The L15V26, ZLD15A1b, and L15V36 feature picture-in-picture. Note that PIP on these models only works in PC mode (main source set to RGB-PC).

The L15V26C has 120V power input instead of 12V. The power supply is located inside the TV instead of being external like the 12V versions. The V24S model is a commercial model that features RS-232 input and has no component inputs (removed to make room for the RS-232 input). The L15V36 features an improved LCD display panel featuring Super IPS Technology. It is brighter, has a larger viewing angle, and a higher contrast ratio than previous models.



## 17" MODELS

The 17" widescreen models feature 1280 x 768 WXGA Resolution and support for HDTV. They also feature Super IPS Technology which allows for distortion-free viewing from almost any angle. In addtition to normal A/V inputs, they feature one VGA input (no DVI). The L17W36DVD is the same as L17W36 but features a built-in slot load DVD player mounted vertically behind the screen. The commercial model (RU-17LZ50C) features RS-232.



ZENITH
L17W36
L17W36DVD (built-in DVD)



LG
RU-17LZ22
KU-17WDVD (built-in DVD)



LG
17LX1R



ZENITH Z17LZ5R
LG RU-17LZ50C

## 20" MODELS

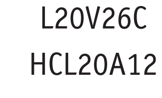
The 20" models do not support HDTV. They will accept EDTV input (480p) and have component inputs. They have no VGA connector like most LCDs.

ZENITH MODELS



ZLD20A1





L20V26
L20V26C
HCL20A12



L20V36



Z20LA7R



L20V34

LG MODELS



RU-20LA61
RU-20LZ61



20LA6R

# MODELS

## 23" MODELS

The 23" widescreen models have the same features as the 17" models including 1280 x 768 WXGA resolution. They also feature Super IPS Technology which allows for distortion-free viewing from almost any angle. The two on the right feature DVI w/ HDCP and RS-232 the other two have RGB (VGA) and no RS-232.



ZENITH L23W36



LG RU-23LZ21



23LX1R/2R
23LX1RV (BUILT-IN DVD)



Z23LZ5R
RU-23LZ50C

## 26/27" MODELS

Z26LZ5R
L27W46
RU-27LZ50C
1280 x 768p
176° x 176°
NTSC Tuner
DVI with HDCP
RS-232





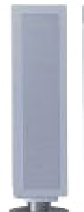


LG 26LX1D/2D
1366 x 768p Resolution
1200:1 Contrast Ratio
NTSC/ATSC/QAM w/CableCARD
HDMI with HDCP
IEEE 1394 w/ DTV link
Memory Card Reader
TV Guide On Screen®
RGB (VGA) & RS-232
XD Engine™

## 30" MODELS

The 30" widescreen models support HDTV and feature RS-232. The L30W36 does not have a built-in tuner.

Type - HDTV
Resolution - 1280 x 768 (16:9)
Viewing Angle - 176° x 176°
DVI & VGA
RS-232





| ZENITH | LG |
|---|---|
| L30W26 | MW-30LZ10 |
| L30W36 | MW-30LZ12 |

LG RU-30LZ50C
NTSC TUNER
DVI
RS-232



LG DU-30LZ30
ATSC TUNER
VGA & DVI
RS-232



## 32" MODELS

Zenith
Z32LZ5R
LG
RU-32LZ50C



1366 x 768p Resolution
1200:1 Contrast Ratio
NTSC Tuner
DVI with HDCP
RGB (VGA) & RS-232

32LP1D



32LX1D/2D



1366 x 768p Resolution
1200:1 Contrast Ratio
NTSC/ATSC/QAM w/CableCARD™
HDMI with HDCP
IEEE 1394 w/ DTV link
Memory Card Reader
TV Guide On Screen®
RGB (VGA) & RS-232
XD Engine™

## 37" MODELS

LG DU-37LZ30
1366 x 768p Resolution
1000:1 Contrast Ratio
NTSC/ATSC/QAM
DVI with HDCP
XD Engine™
RGB (VGA) & RS-232



LG 37LC2D
1366 x 768p Resolution
1600:1 Contrast Ratio
NTSC/ATSC/QAM
HDMI with HDCP
XD Engine™
RGB (VGA) & RS-232



# MODELS

## 42" MODELS



LG DU-42LZ30
1366 x 768p Resolution
1000:1 Contrast Ratio
NTSC/ATSC/QAM
DVI with HDCP
RGB (VGA) & RS-232
XD Engine™



LG 42LP1D
1366 x 768p Resolution
1200:1 Contrast Ratio
NTSC/ATSC/QAM w/CableCARD™
HDMI with HDCP
RGB (VGA) & RS-232
Memory Card Slot
XD Engine™



LG 42LB1DR
Built-in DVR (160GB)
1366 x 768p Resolution
1600:1 Contrast Ratio
NTSC/ATSC/QAM w/CableCARD™
HDMI with HDCP x2
RGB (VGA) & RS-232
XD Engine™

## 55" MODEL

LG 55LP1M



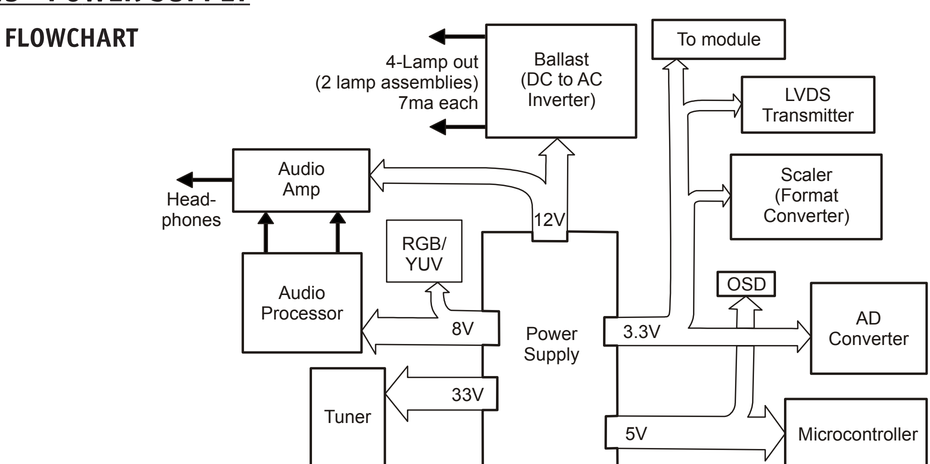
1920x1080p Resolution
1200:1 Contrast Ratio
NTSC/ATSC/QAM
HDMI with HDCP
RGB (VGA) x2 & RS-232

# CIRCUIT DESCRIPTIONS

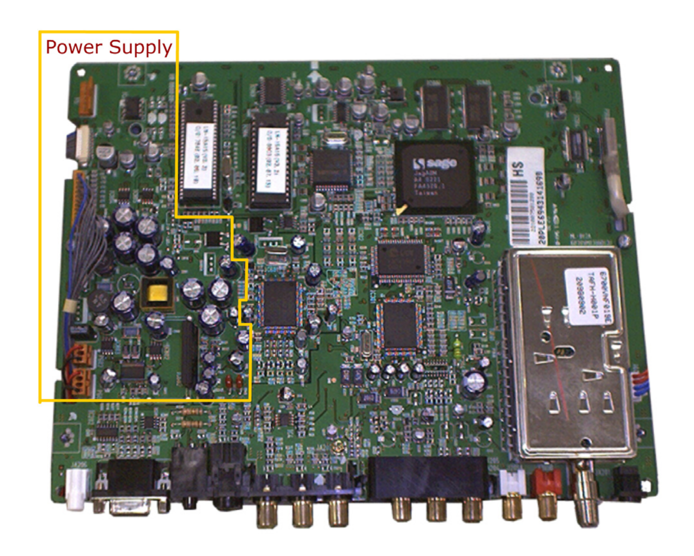
## 15"CIRCUIT DESCRIPTIONS (L15V26)

### 15" POWER SUPPLY

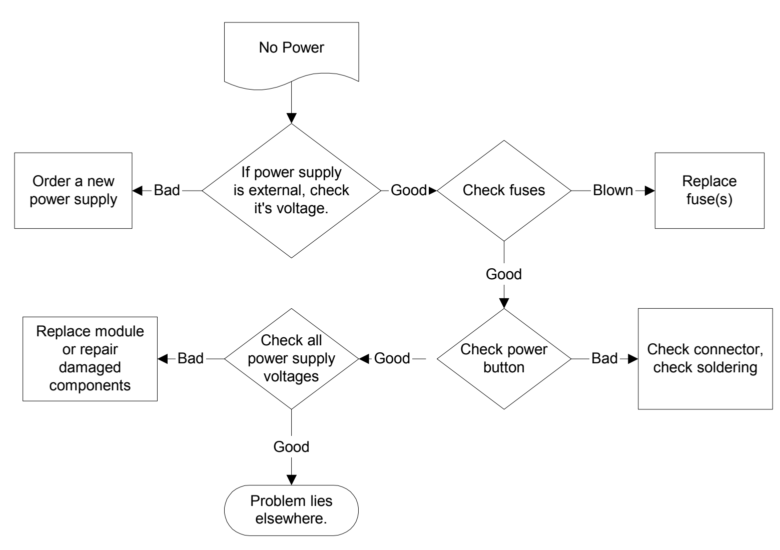
#### FLOWCHART




#### PCB



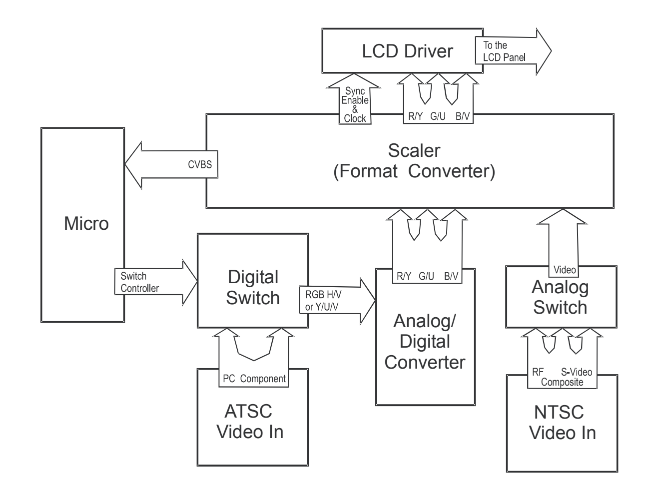

#### TROUBLESHOOTING DIAGRAM



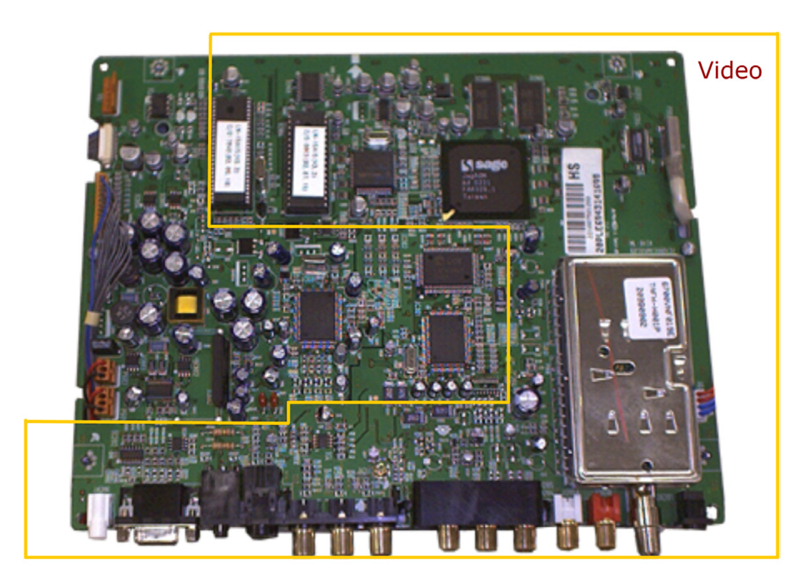
# CIRCUIT DESCRIPTIONS

## 15" VIDEO

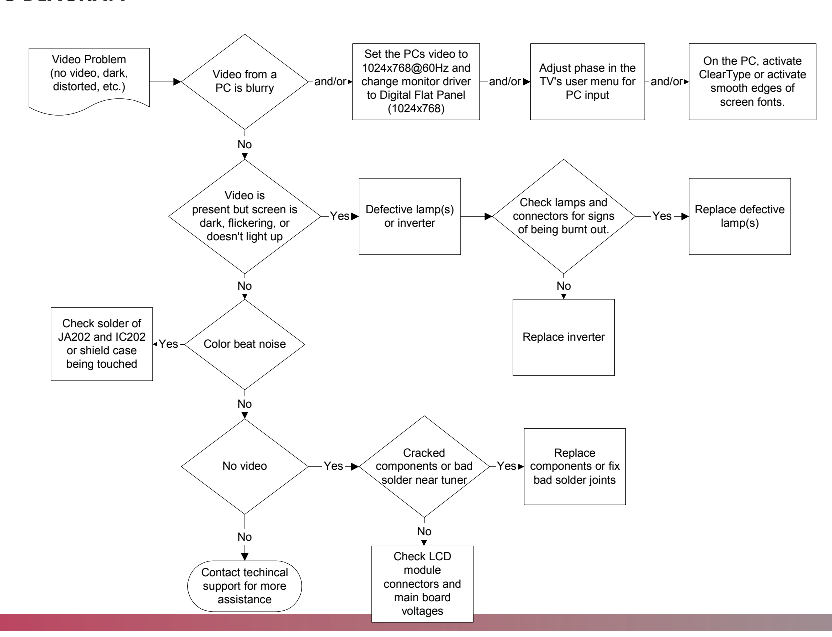
### FLOWCHART




### PCB

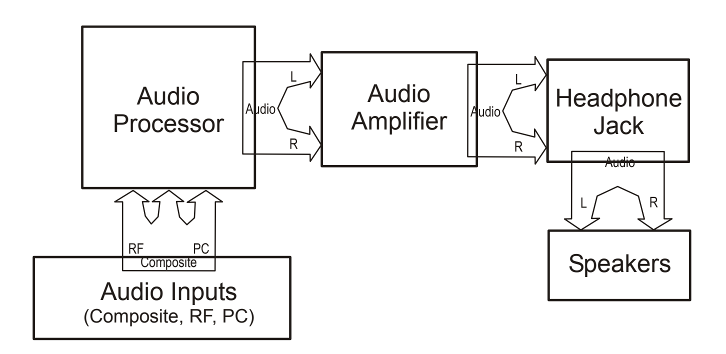



### TROUBLESHOOTING DIAGRAM

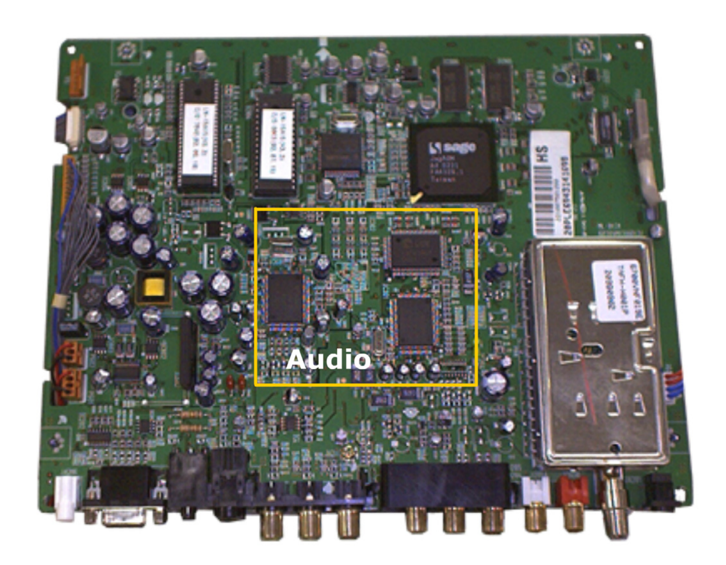


## 15" AUDIO

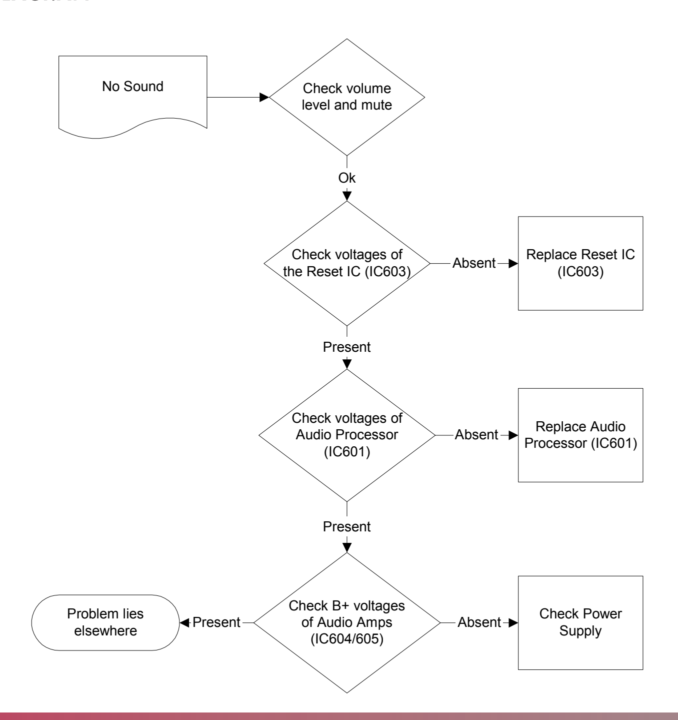
### FLOWCHART




### PCB




### TROUBLESHOOTING DIAGRAM

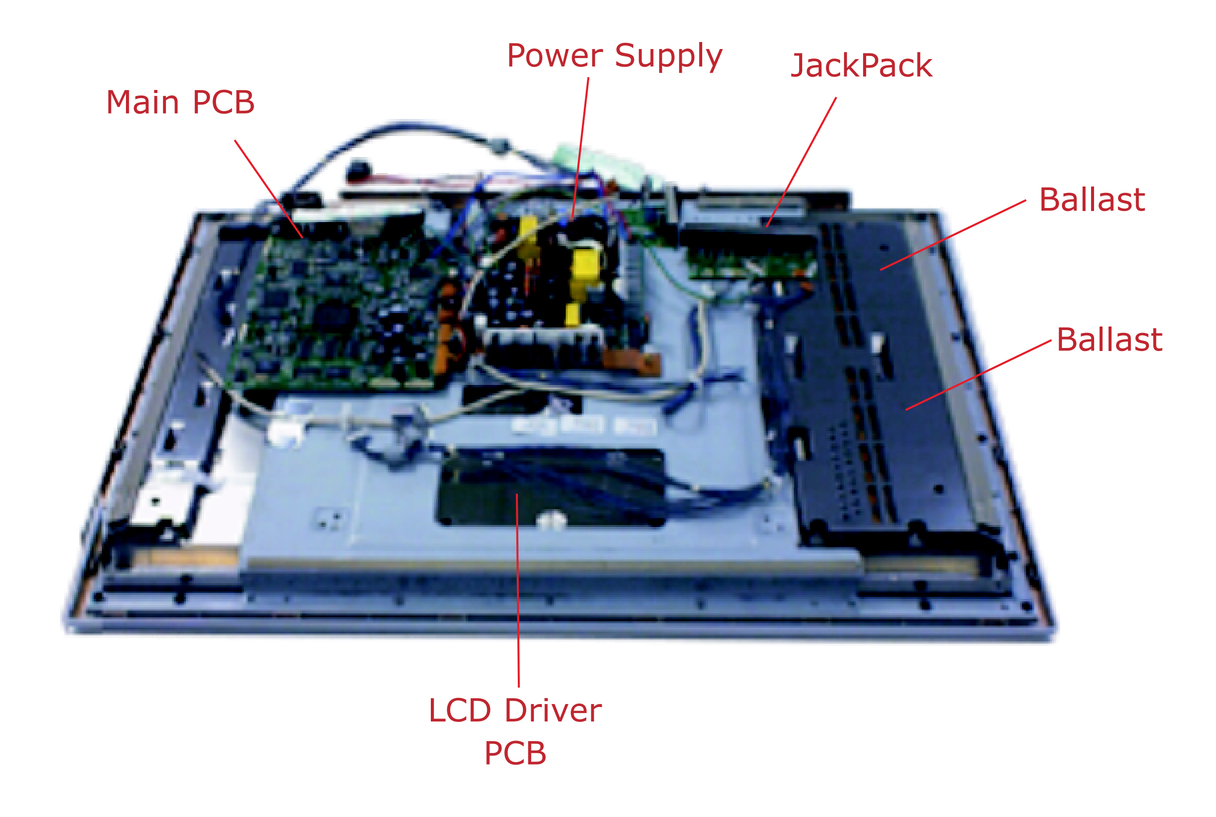


# CIRCUIT DESCRIPTIONS

## 30"CIRCUIT DESCRIPTIONS (L30W26)

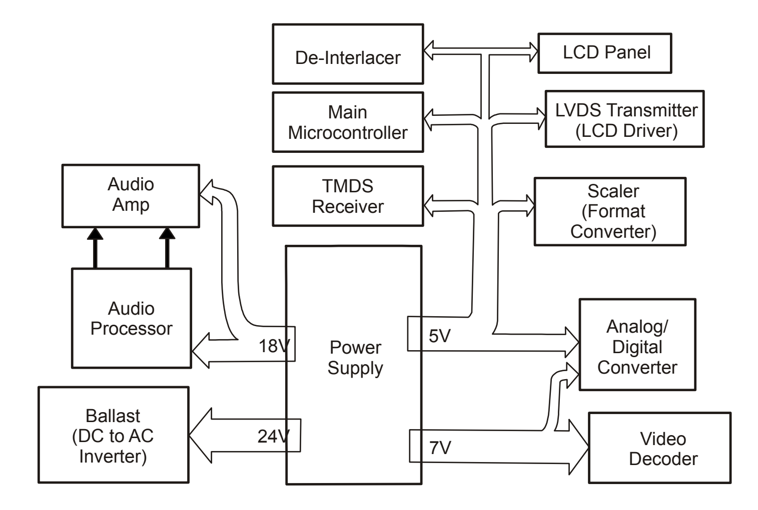
### OVERVIEW

This set of descriptions is based on the 30" models L30W26, L30W36, MW-30LZ10, and MW-30LZ12. They are HD Monitors with no built-in tuners. HD inputs include component, DVI, and VGA (RGB).

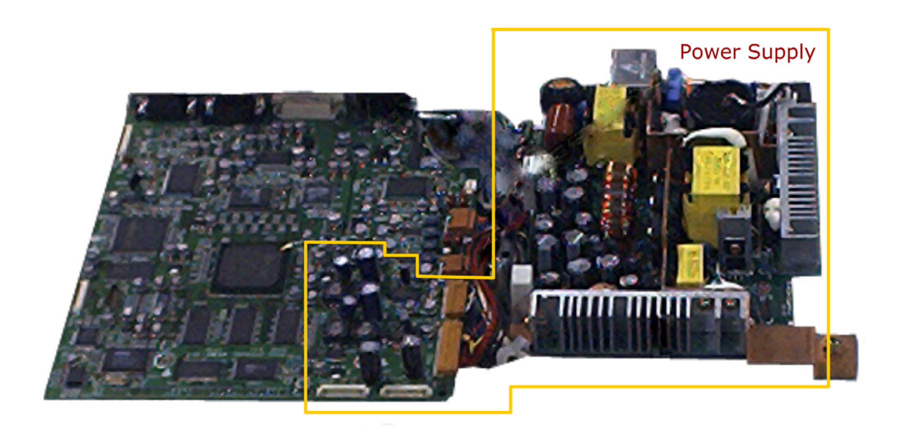


## 30" POWER SUPPLY

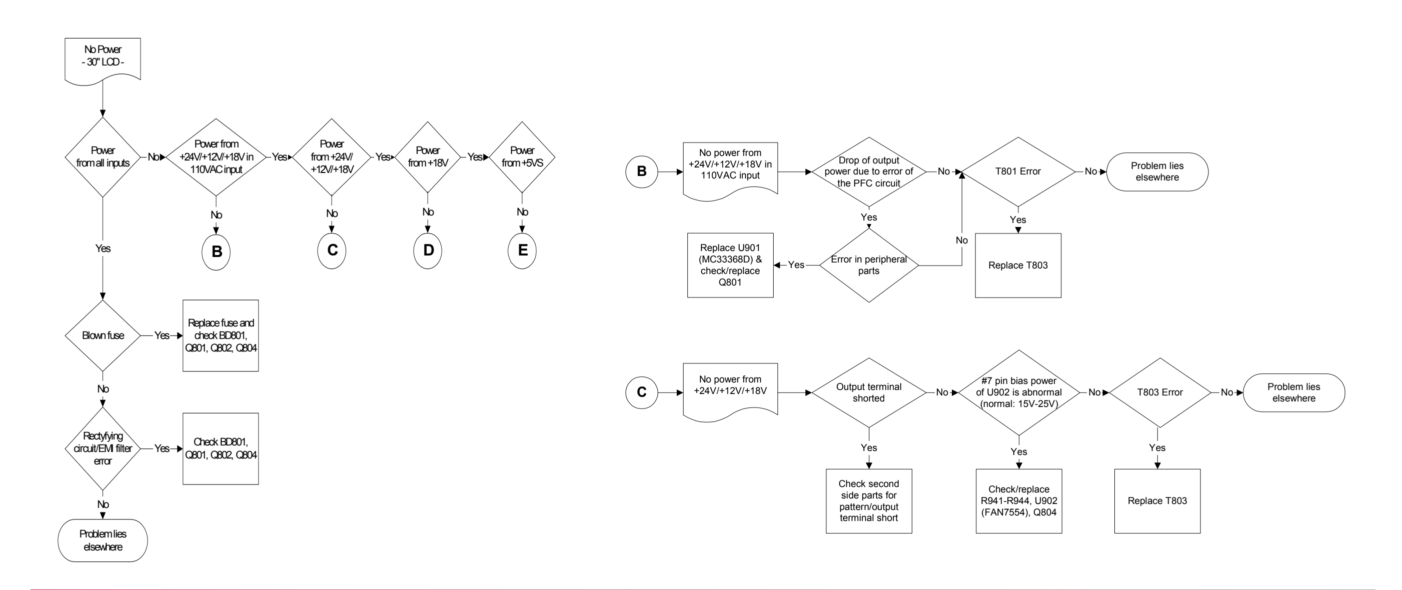
### VOLTAGE DIAGRAM

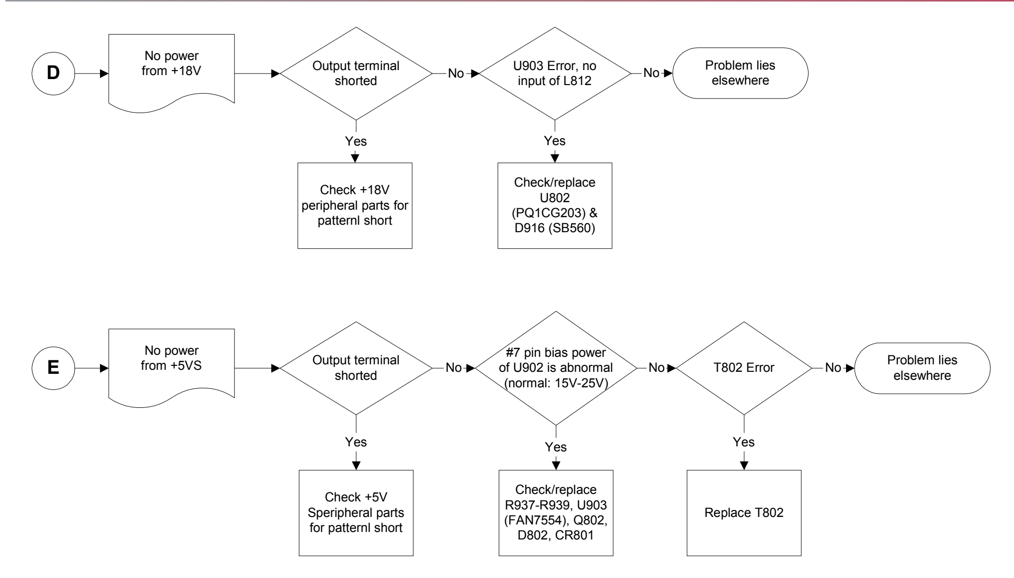



### PCB




### TROUBLESHOOTING DIAGRAM

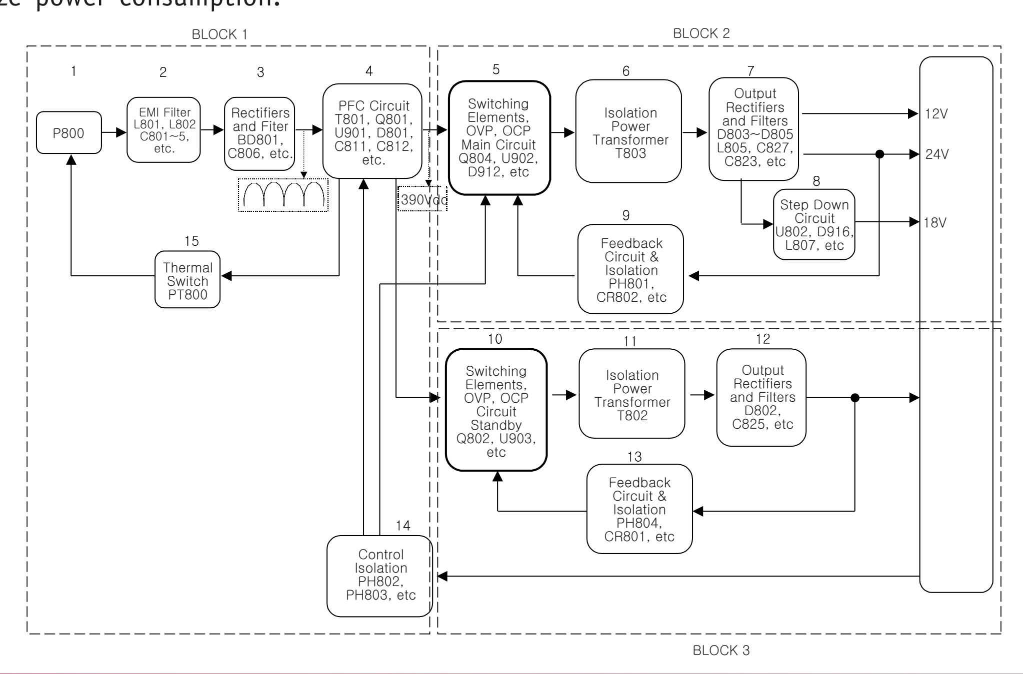





### POWER SUPPLY DESCRIPTION

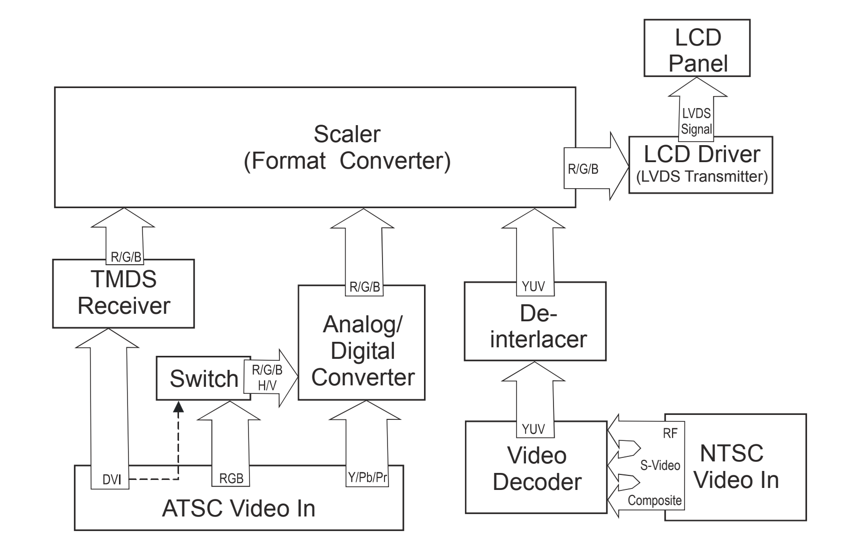
If the AC Input voltage (1) is confirmed, this voltage is adjusted as a DC wave form through the EMI filter (2) and the first rectifier/filter (3). This adjusted wave form is input to PFC circuit (4), Power Factor Correction). The output voltage (+390Vdc) of the PFC circuit becomes a main input voltage of the MAIN (5) and standby switching part (10). Using elements such as the FET and PWM IC, the switching parts (5, 10) convert this high DC voltage (390Vdc) to a spherical wave with a high frequency. To keep the secondary adjusted voltage regular and safe with changing input voltage and output load, the output voltage is monitored and fed back to the switching part through a control circuit (9).

BLOCK 2 works as a forward converter by receiving input from BLOCK 1 and supplying MAIN DC (+24V and +12V) voltage and the step down circuit (8) supplies +18V. BLOCK 3 works as a flyback converter by receiving the input of BLOCK 1 and supplying +5V for standby. A protection circuit is built into the switching part (5, 10) to protect over current, short, or over voltage of the secondary output. When overheating occurs, this circuit protects the output and switches the thermal switch (15) to radiator. The PFC circuit protects against fire or other accidents by turning the AC voltage off. If the OFF signal is transmitted to the PFC circuit (4). Only the +5V circuit for standby works and others are turned off to minimize power consumption.

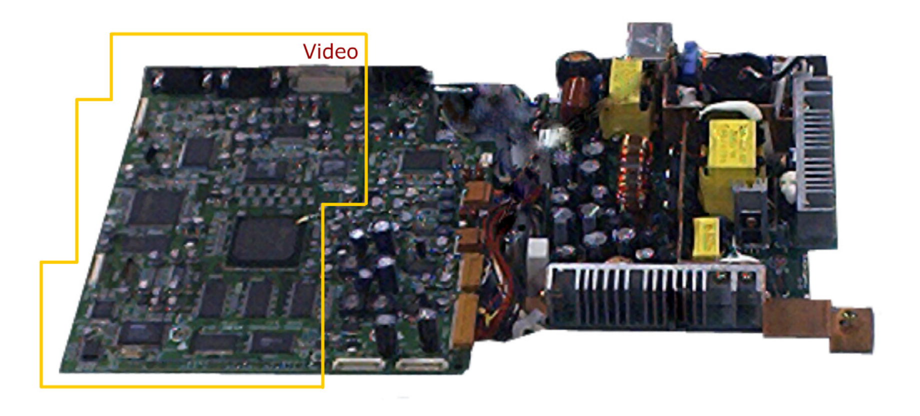


## 30" VIDEO

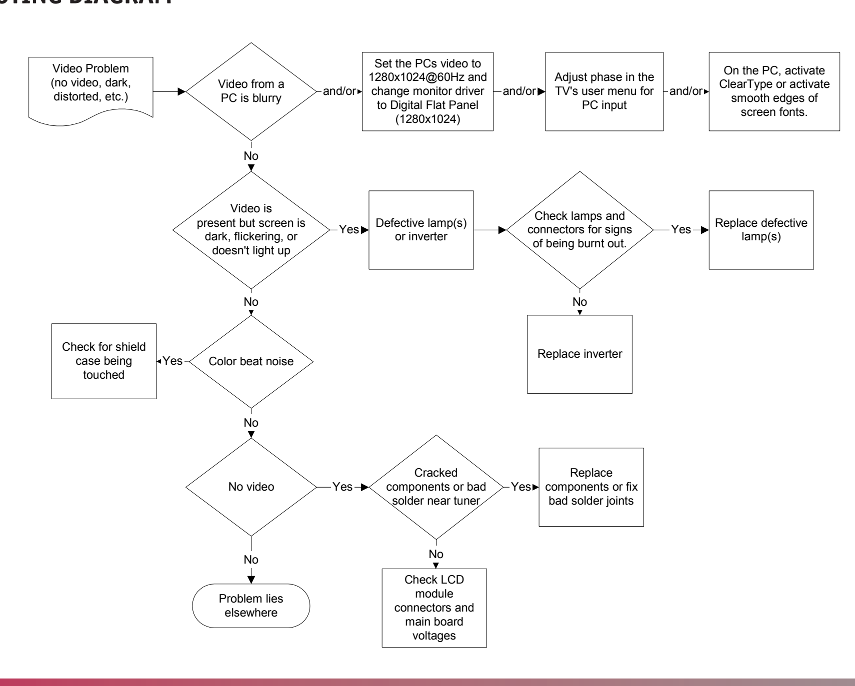
### FLOWCHART




### PCB

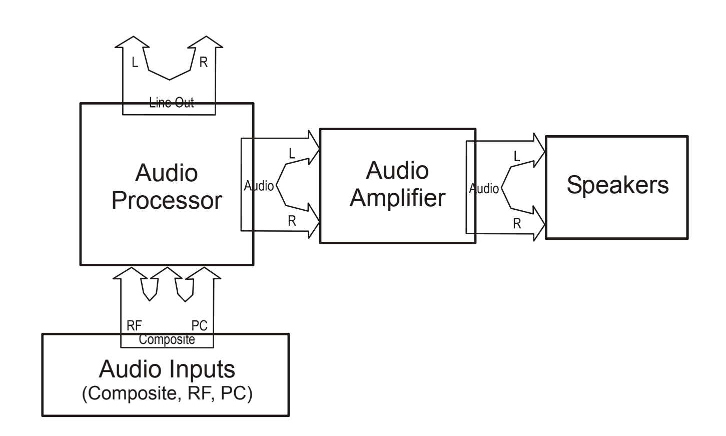



### TROUBLESHOOTING DIAGRAM

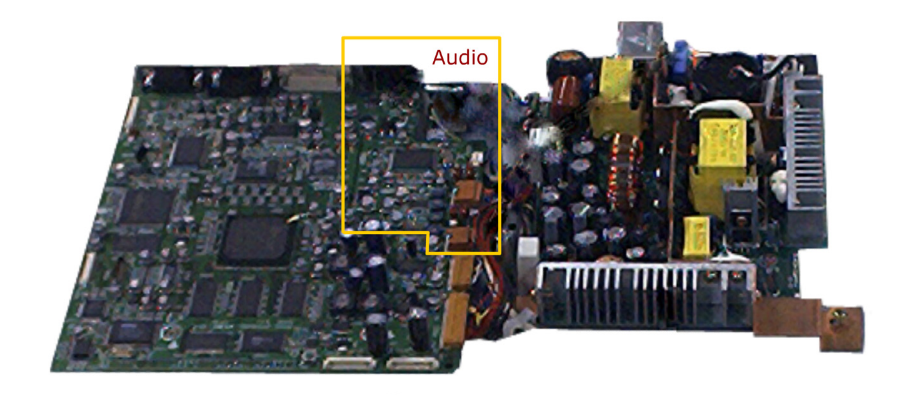


## 30" AUDIO

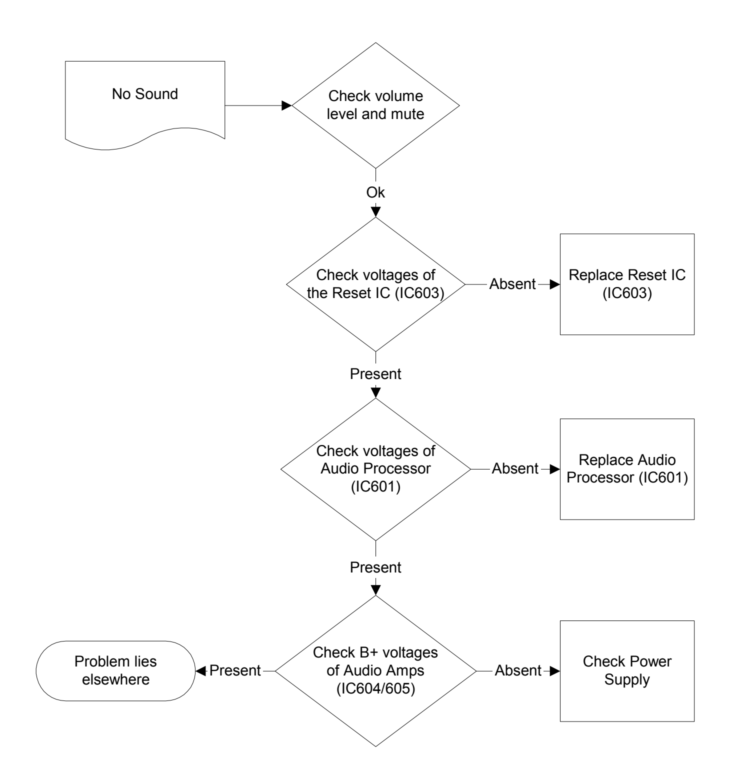
### FLOWCHART




### PCB



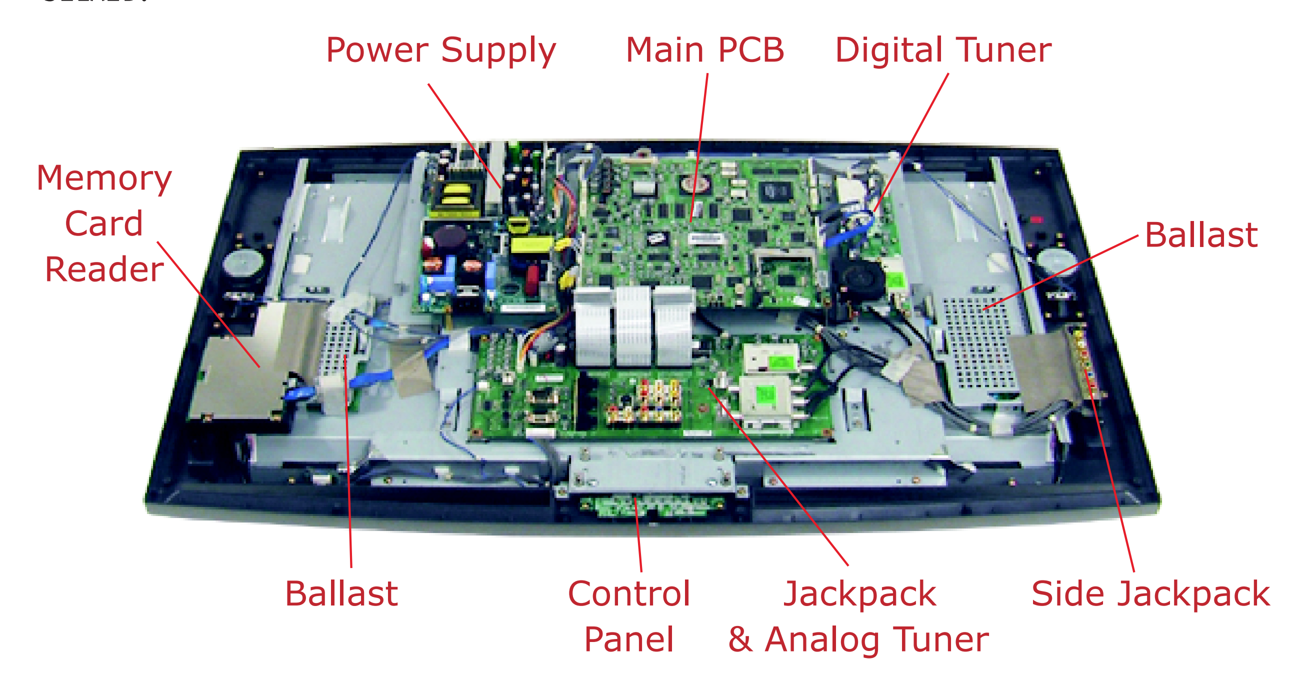

### TROUBLESHOOTING DIAGRAM



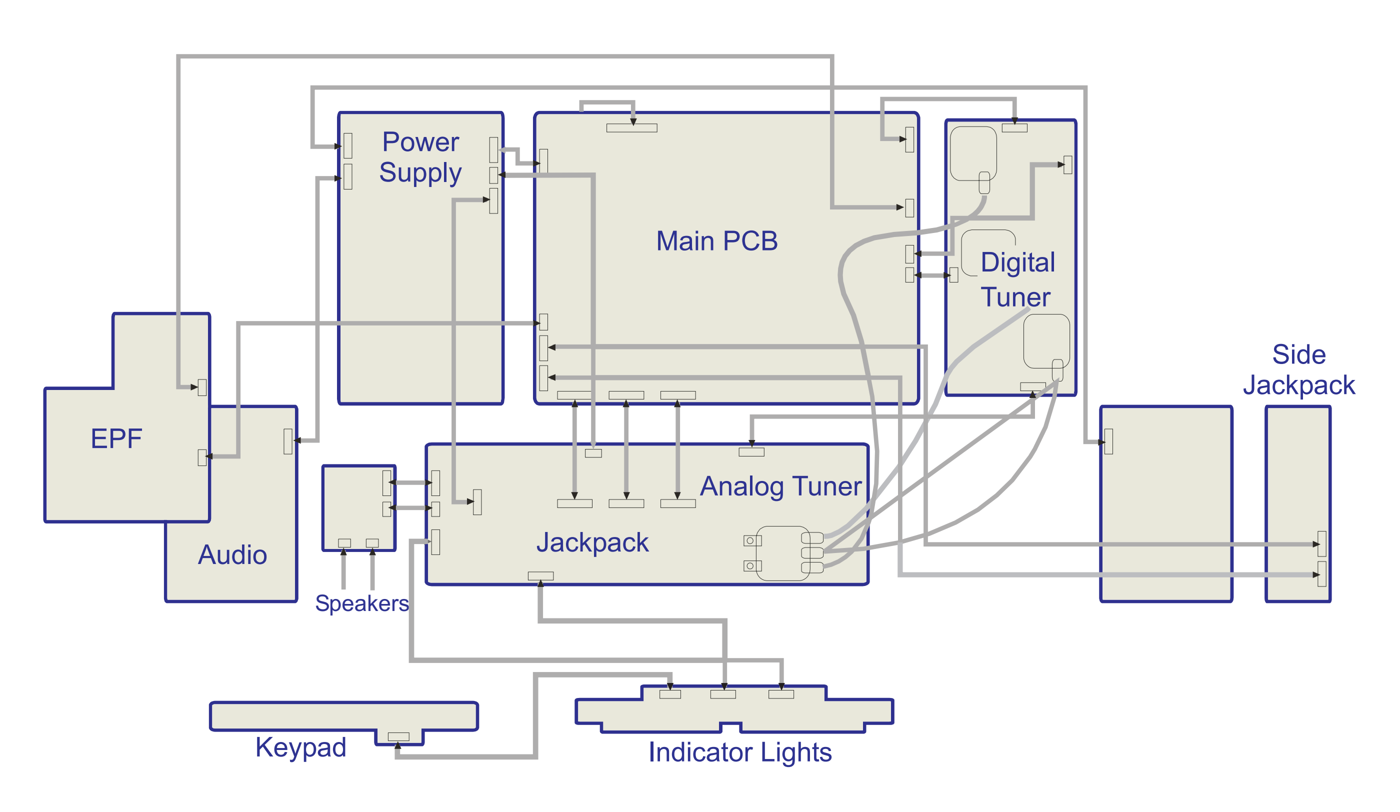
## 32" CIRCUIT DESCRIPTIONS (CABLECARD MODELS)

### OVERVIEW

The following descriptions refer to models with CableCard: 32LX1D, 26LX1D, 26LX2D, 32LP1D, and 32LX2D.



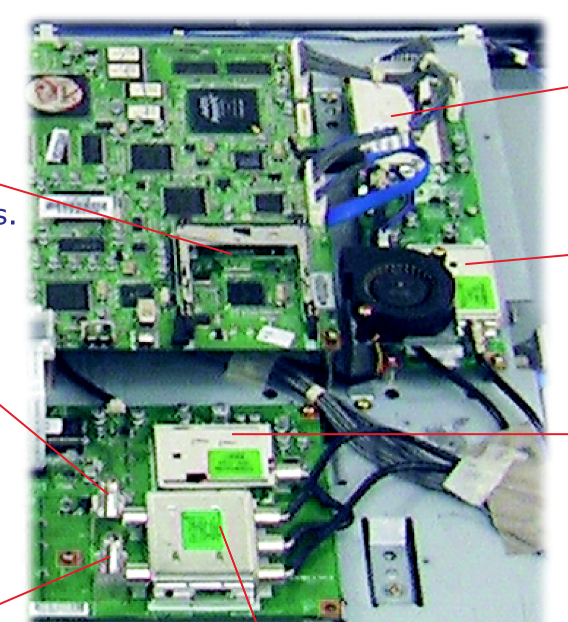

### WIRING DIAGRAM



## 32" TUNING SYSTEM

### OVERVIEW

The tuning system of CableCARD™ models have four essential parts: analog tuner, digital tuner, outer band tuner, and cable card slot.




*Analog Tuner*

The analog tuner is a standard NTSC tuner. It tunes analog signals from off-the-air (OTA) broadcasts and analog cable signals.

*Digital Tuner*

The ATSC tunes digital OTA signals (8-VSB) and digital cable signals (QAM). It supports both QAM64 and QAM256 digital cable standards.

*Outer Band Tuner*

This tuner translates data from digital signals. Mainly used for communications between a cable card and the cable company.

*CableCARD™ Slot*

A cable card on a Digital Cable Ready (DCR) television decrypts encoded signals from digital cable allowing cable companies to protect content on certain channels. Please refer to our cable card training for more information. For more information refer to the Cablecard section a the end of this manual.

### TROUBLESHOOTING

*No Analog TV (Cable or OTA)*

Problem: Snow on all analog cable and OTA channels. Occasionally a memory card error appears on the screen.

Resolution: Check the analog tuner on the jackpack PCB. Check circuitry and connections, replace the PCB if necessary.

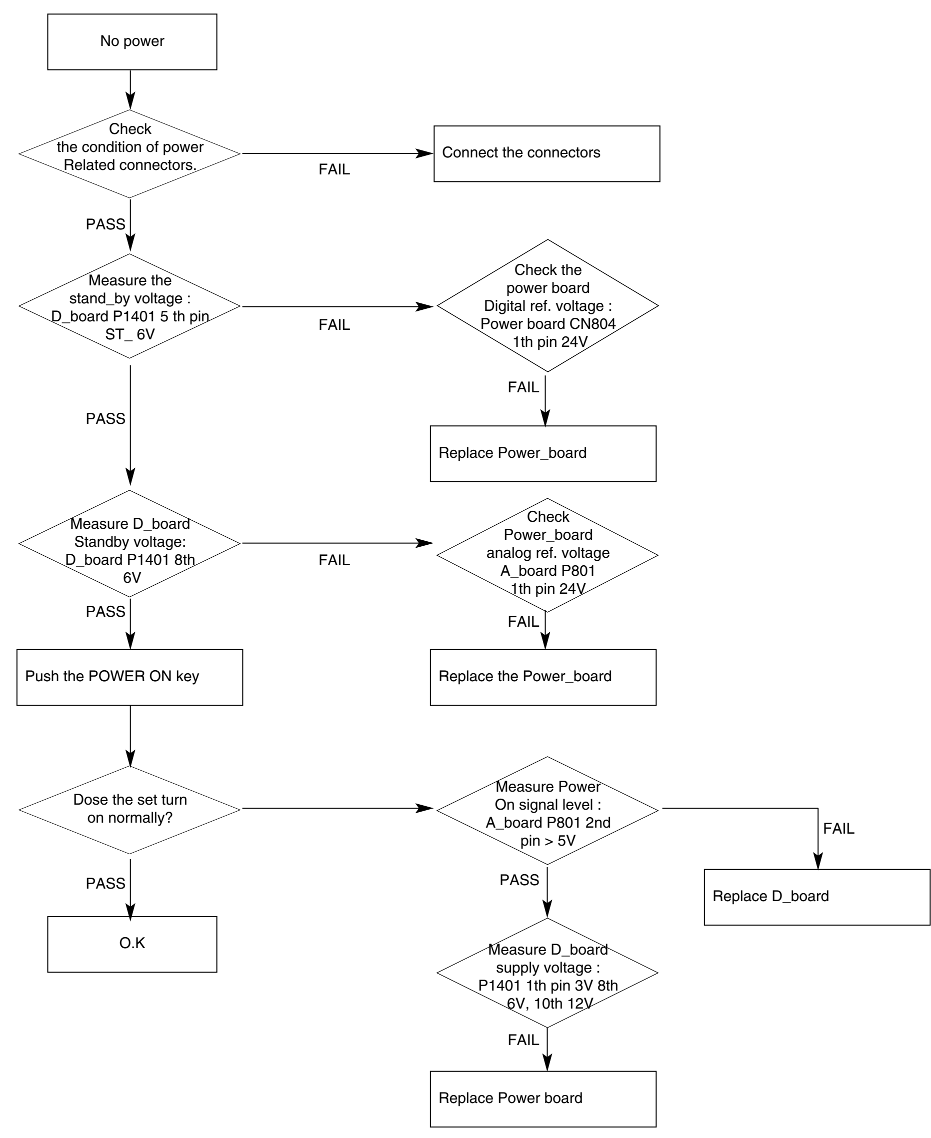
*No Digital TV (Cable or OTA)*

Problem: Snow on all digital cable and OTA channels.

Resolution: Check the digital tuner on the digital tuner PCB. Check circuitry and connections, replace the PCB if necessary.

## 32" POWERSUPPLY

### TROUBLESHOOTING




*General Troubleshooting*

Problem: Doesn't go into standby mode (no red LED)

Resolution: Check power supply circuity (and fuse).

Problem: LED blinks but stays red after pressing power.

Resolution: Check power supply or main PCB. Power supply is trying to turn on but doesn't receive any feedback from the TV, so it turns back off.

Problem: LED blinks green but then goes back to red.

Resolution: Check fan.

## 32" VIDEO

### TROUBLESHOOTING

*No video/Audio ok*

Problem: Audio but no video.

Resolution: If the backlight is turning on, then most likely the problem is with the main PCB or LCD driver. If the backlights don't turn on, the ballast or lamps are most likely the problem.

*Slow motion/Ghosting*

Problem: Intermittent slow motion on analog.

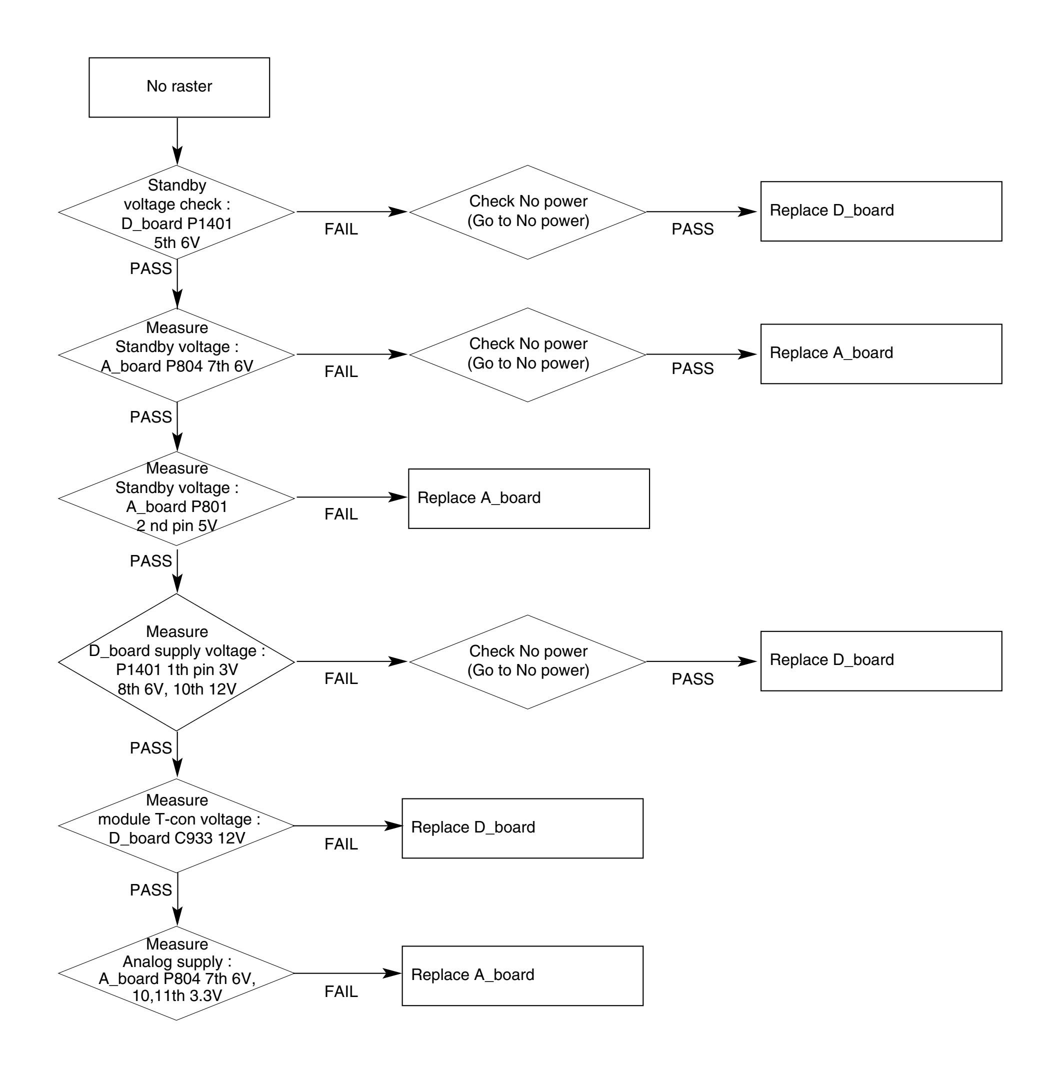
Resolution: Install firmware version 3.18 or newer or replace main PCB.

*Green Tint on Component*

Problem: Bad color or green tint on component inputs.

Resolution: Install firmware version 3.18 and then adjust color settings in the service menu. Write down original settings in case you need to return to those. Make sure you are in component input mode before entering the service menu. Some recommended color settings for component:

| | |
|---|---|
| Red Gain 139 | Red Offset 54 |
| Green Gain 155 | Green Offset 45 |
| Blue Gain 139 | Blue Offset 58 |



## 32” AUDIO

**TROUBLESHOOTING**

*Low DTV audio*

Problem: Digital TV audio is at a lower level than analog TV.

Resolution: Install firmware version 3.13 or newer.

*Auto volume up*

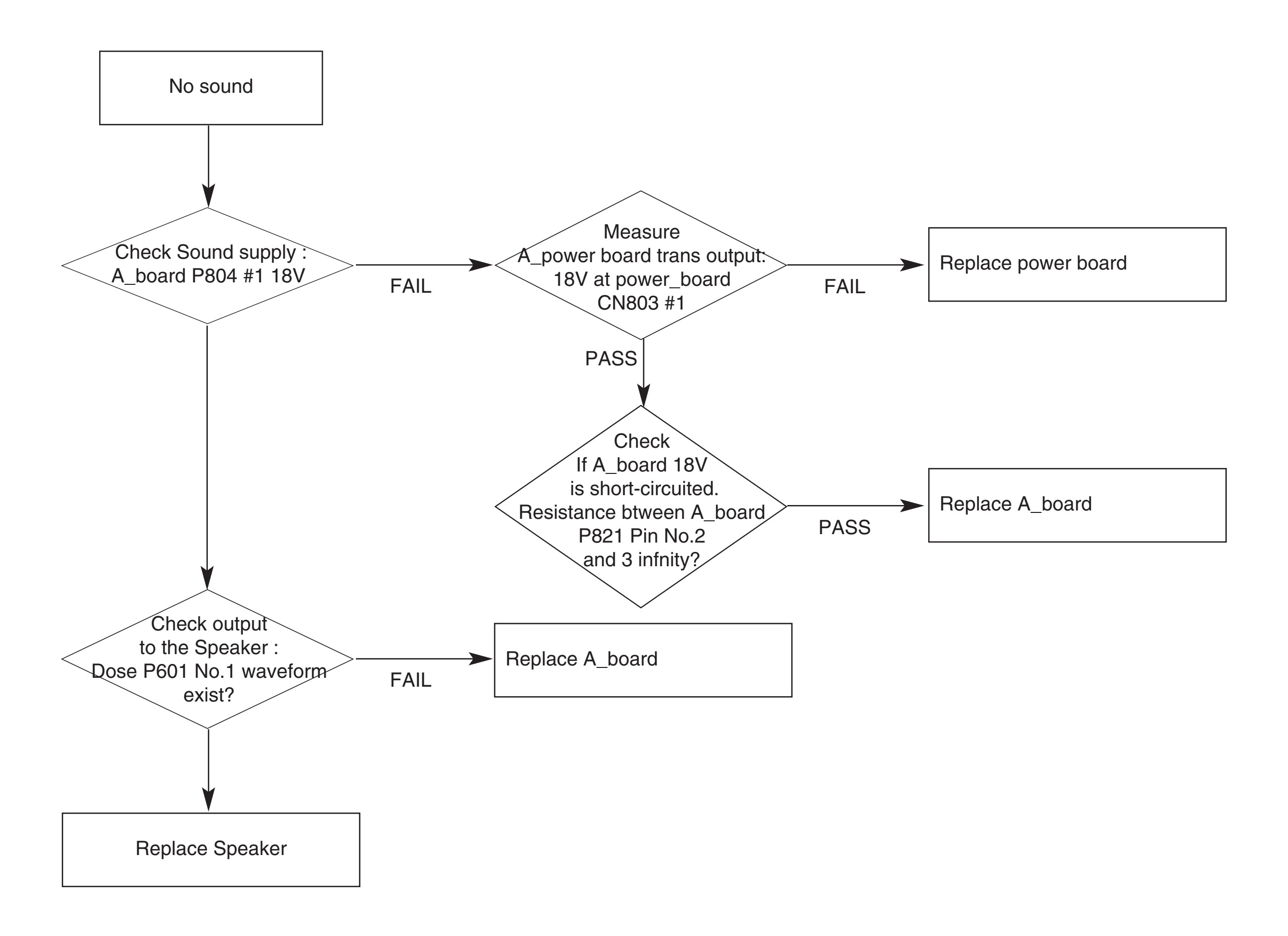
Problem: The volume suddenly goes up when the TV is turned on.

Resolution: Most likely changing the control panel PCB will fix the problem. Also check the connection on the main PCB.

*Video but no sound*

Problem: Partial or no sound. Resolution: First, check the menus to make sure the speakers are not turned off. Try different sources. If all sources have no sound, change the PCB that handles audio (normally the main PCB, jackpack PCB on new models with cable card support). Also check all connectors and cables.

Resolution: If only digital audio (from HDMI or Optical input) is missing, the input device doesn’t support Dolby digital or the TV needs an updated main PCB. There are a few 2005 models that did not process digital audio properly and audio processing was updated during production. In this case, changing the Jackpack PCB will remedy the problem.

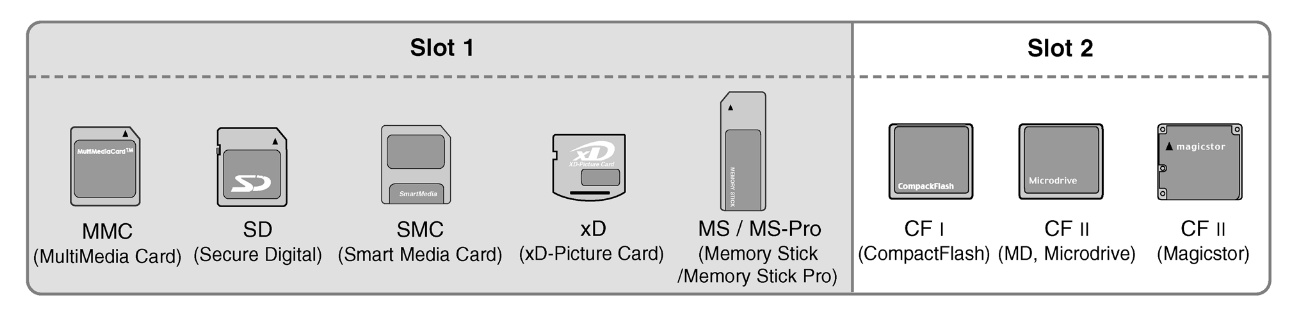


# FIRMWARE UPDATES

## FIRMWARE UPDATES VIA MEMORY CARD

Firmware can be updated using a memory card on newer LCD TVs that feature a memory card reader. When a memory card is inserted, the TV will look for any firmware updates located on the card. If it doesn't find an update newer than the version on the TV, it displays the normal media menu for displaying photos or playing music from the card.

Supported memory cards:




### CHECK HARDWARE VERSION

Before updating the firmware, check the hadware version to be sure it will support the firmware you wish to install. To open the diagnostics screen, highlight the Cable icon in the user menu and then press the zero "0" button three times. The hardware version determines which firmware will work with that TV. If the hardware version is below 3.00, 3.13 is newest firmware that will work. For version 3.00, up to the 3.15 firmware will work. Version 3.01 does not currently need a firmware update since 3.16 is it's original firmware.

### FIRMWARE 3.18 SPECIAL REQUIREMENTS

Fo rsome models, firmware release 3.18 has different versions for different model revisions. Check the suffix of the TV and use the list below to determine which update to use. You will find the suffix on the back of the TV next to "Product Code". You can use either method to install the firmware, just make sure you use the correct file. A memory card received from LG will have the files for all three suffixes on it, use the Expert Method to choose the correct firmware to install.

slusllm - 3.18.3

spusllm - 3.18.4

spusltm - 3.18.5

## UPDATE INSTUCTIONS - NORMAL METHOD

1) Copy the Firmware update to the memory card. This has already been done for you if the card came from LG Customer Service. The firmware file will have the file extension ".epk". Only copy the firmware update for your model TV.
2) Turn the TV on and insert the memory card into the TV. If the firmware on the card is newer than the firmware in the TV, the following will be shown:

```
Current TV Software version: 3.08 (date: 5/5/2005)
The following new software is found in the memory card.
File: 42LP1DU_V313_rom.epk
   - Main Software: 3.13
```

3) Press ENTER on the remote to begin the firmware update. The TV will restart automatically and show the progress of the update. **Do not remove the memory card or remove power from the TV until complete.**

```
Reading the file...Done
Main Software: Upgrading...22 Percent
```

4) The TV will show the following messages when the firmware update is complete:

```
Reading the file...Done
Main Software: Upgrading...Done

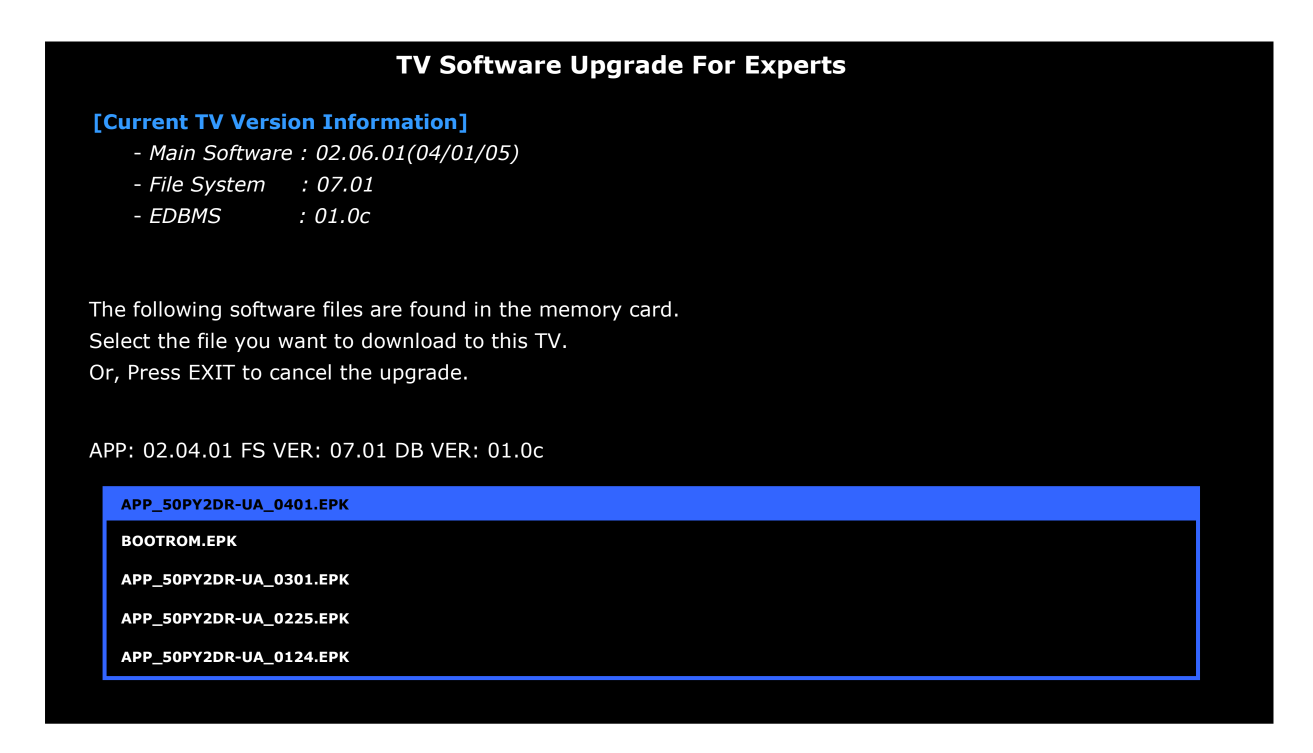
The software upgrade has been successfully completed.
Press ENTER to restart the TV now.
The TV will restart automatically in 14 seconds.
```

5) Press ENTER. After restarting, the TV is ready to use.

## UPDATE INSTUCTIONS - EXPERT METHOD

Expert Mode will allow any firmware version on the card to loaded into the TV. This allows an older version of the firmware to be loaded when needed.

1) Copy the Firmware update to the memory card. The firmware file will have the file extension ".epk". Only copy the firmware update for your model TV.
2) Turn the TV on and insert the memory card into the TV.
3) If a menu displays on the screen, exit out of that screen. Press the MENU button and highlight (scroll down to) the Option menu. Press the MARK button 7 times and the expert mode screen will appear.




4) Use the arrow keys to select the firmware update to install. Press OK and follow the prompts.
5) When the update is complete, press ENTER to restart the TV. After restarting, the TV is ready to use.

# DISASSEMBLY

Models 23" and under have a similar internal layout and disassembly procedure. Therefore, the following disassembly instructions are divided into two parts. The first part covers the smaller screen LCDs (10"-23") and the other two parts cover large Sscreen LCDs (30” and up). The large screen disassembly instructions are broken into to two parts since some large screen models have a different internal layout. Before disassembling, check the troubleshooting information to theorize what the problem could be and determine the level of disassembly that will be needed.

## SMALL SCREEN MODELS

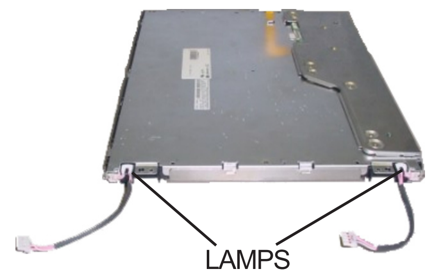
Small screen LCDs have two lamp assemblies, one on top and one on bottom of the screen. To gain access to the lamps, the front and rear cover must be removed. To gain access to the ballast assembly (inverter), only the back cover needs to be removed.

1) First, remove the the stand and back cover.

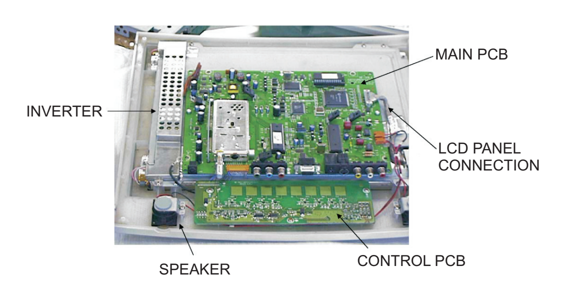
2) Now there is access to the ballast.

3) Remove the display assembly from the front cover in order to gain access to the lamps. First, you will need to remove the PCB shields, uplug the the power switch, and remove both speakers.

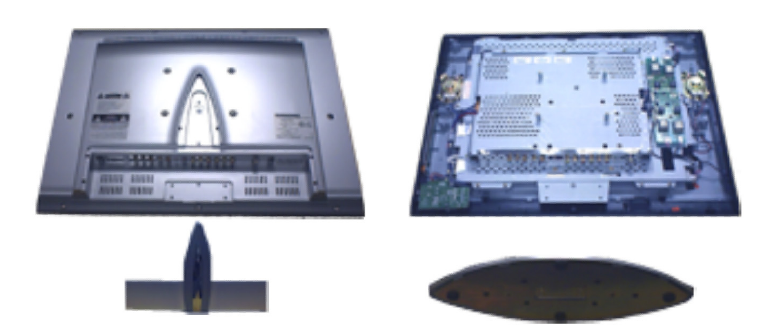
4) To slide the lamps out remove the small screw, unplug the cables from the ballast, and then remove the cables from the black hook located at their base. Now the lamp can slide out.




**15” LAYOUT**

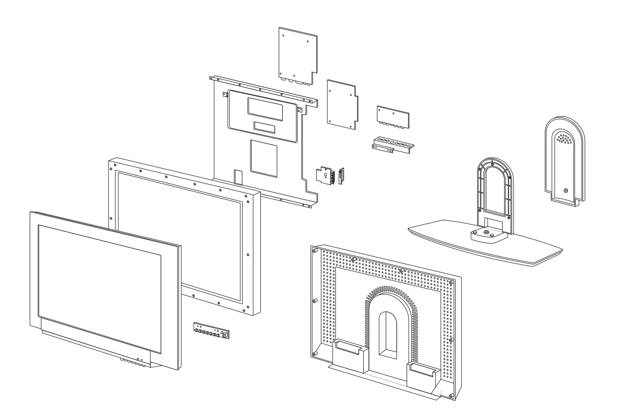



**20” LAYOUT**



## LARGE SCREEN MODELS - PART 1

This set of instructions is based on the 30” models L30W26, L30W36, MW-30LZ10, and MW-30LZ12.

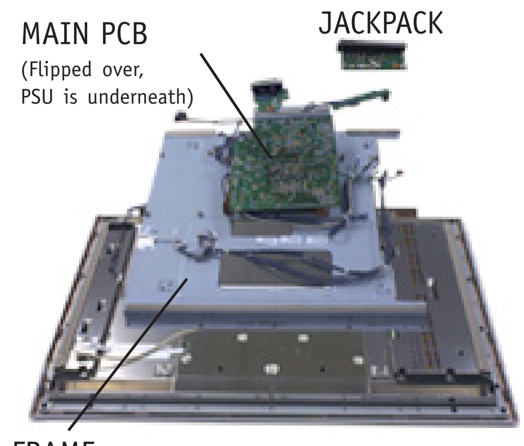


# DISASSEMBLY

*Note: This model contains many screws. During each level of disassembly, keep the screws separated to ease reassembly. If desired, mark the screws and screw hole with different colored markers while disassembling.*

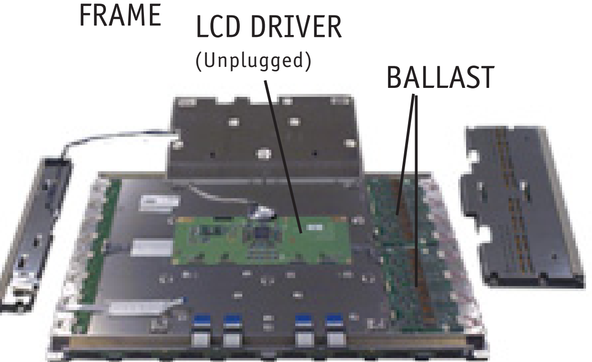
1) Remove the cover and the stand.
2) Remove the back cover.

With the back cover removed, individual circuit boards can be removed. The ballast assemblies can be accessed by removing the shield covering them. To gain access to the lamps, continue with the disassembly, starting with the support assembly. To remove the support assembly, first remove circuit boards that block the assembly's screws.



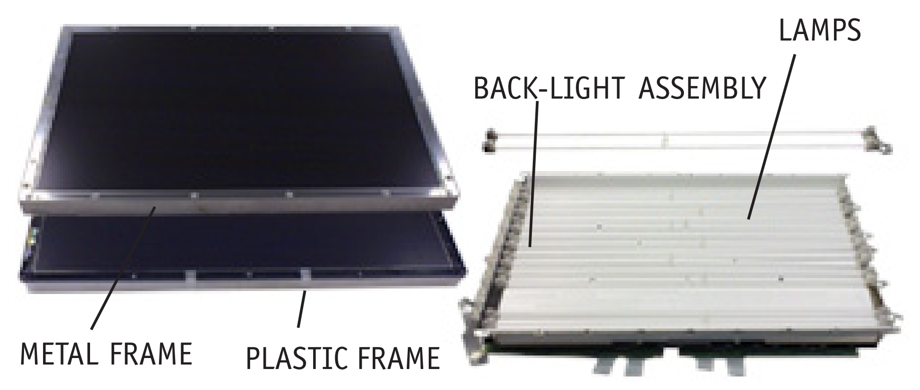

To aid with reassembly, mark each screw and location with a marker to insure they are used in the correct location. Use a different color marker for each level of disassembly.

3) Remove the Speaker and Control panel circuit boards.
4) Remove the Jackpack circuit board.
5) Remove the screws from the NTSC board and lay it over on the Power Supply board (there is no need to disconnect the board). Now, remove the frame and front of the cabinet.



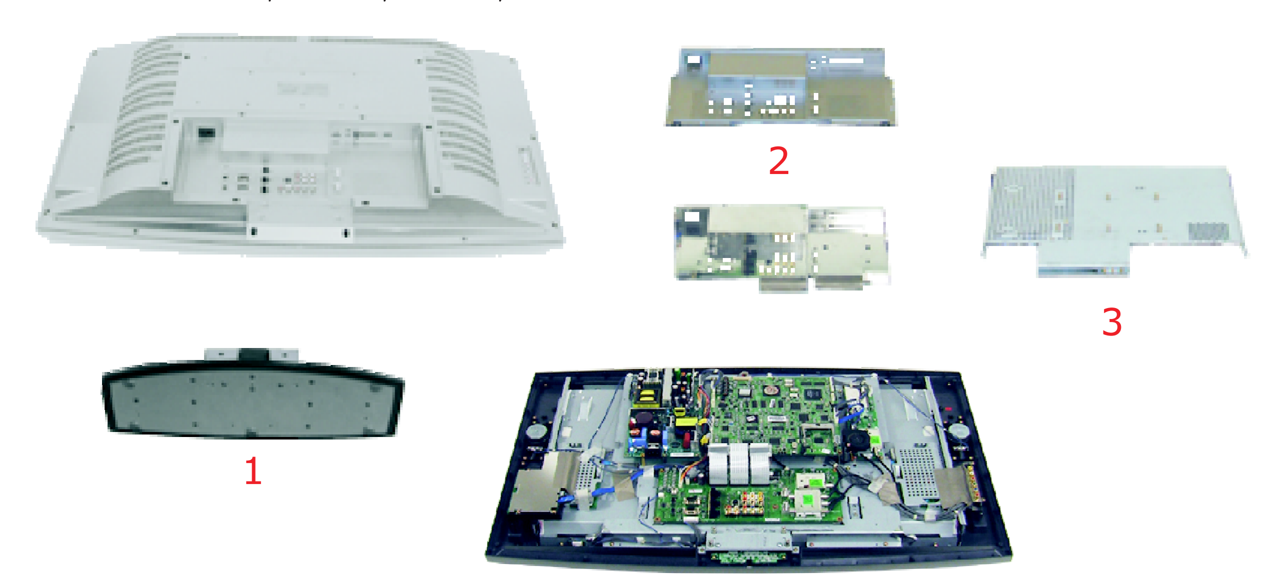

6) Remove the shields from the three remaining circuit boards.
7) Now remove the LCD driver board by removing the cables. There is a latch on each of the female connectors that must be lifted before the cable can be removed.

8) To gain access to the lamps, turn the panel over, remove the screen's metal frame, and remove the screws holding the plastic frame in place.
9) Once the screws are removed, place the metal frame back onto the screen (do not replace the screws). Turn the assembly over and remove the LCD driver cables from their holders. Then *carefully* lift the back-light assembly up from the screen.
10) Replace any defective lamps by uplugging the connectors at both ends, release the bulbs from the plastic holders (in the middle of each lamp assembly), and lift them up.



## LARGE SCREEN MODELS - PART 2

This example covers the models with CableCard. The example was made using the 32LX1D. It is very similar to the 26LX1D, 26LX2D, 32LP1D, and 32LX2D.

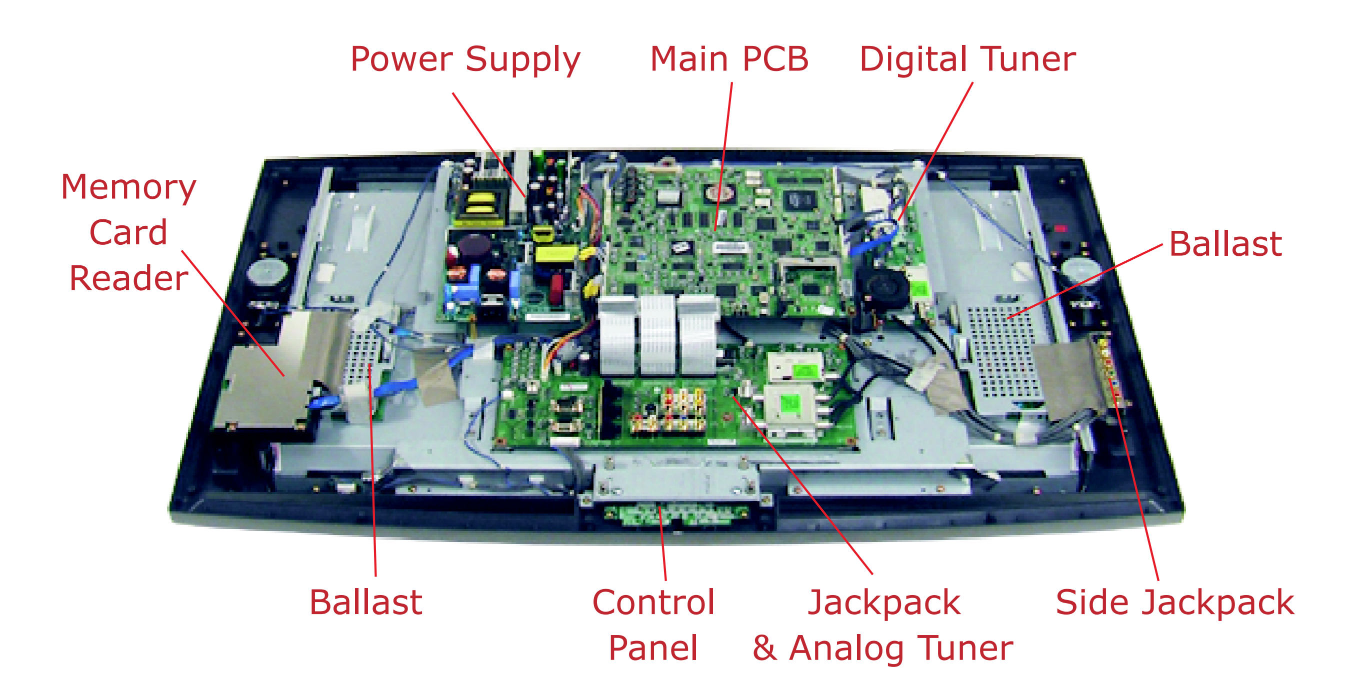



1) Remove the stand and back cover.

2) Remove the Jackpack trim piece and shield.

3) Remove the main shield.

Now most parts can be accessed.

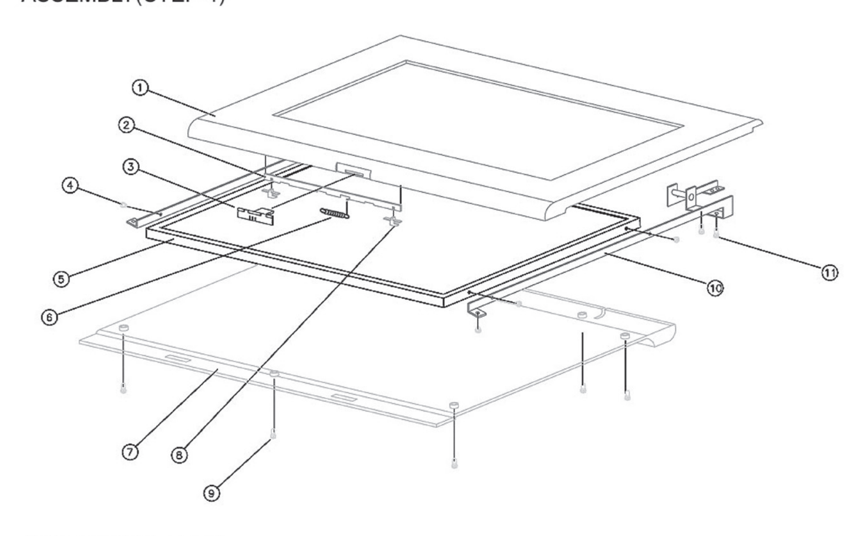


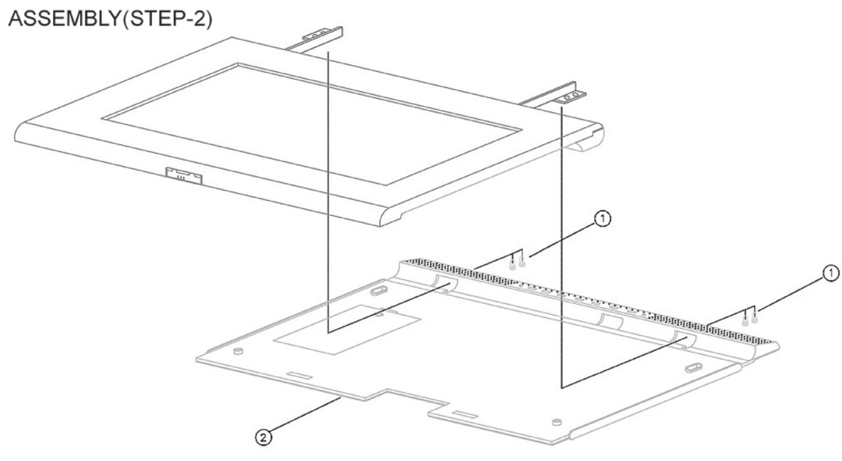
## EXPLODED VIEWS

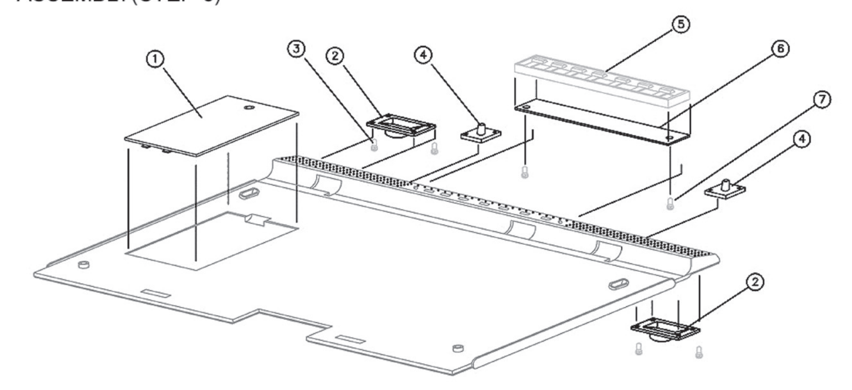
This section contains exploded views to aid in disassembly and assembly.

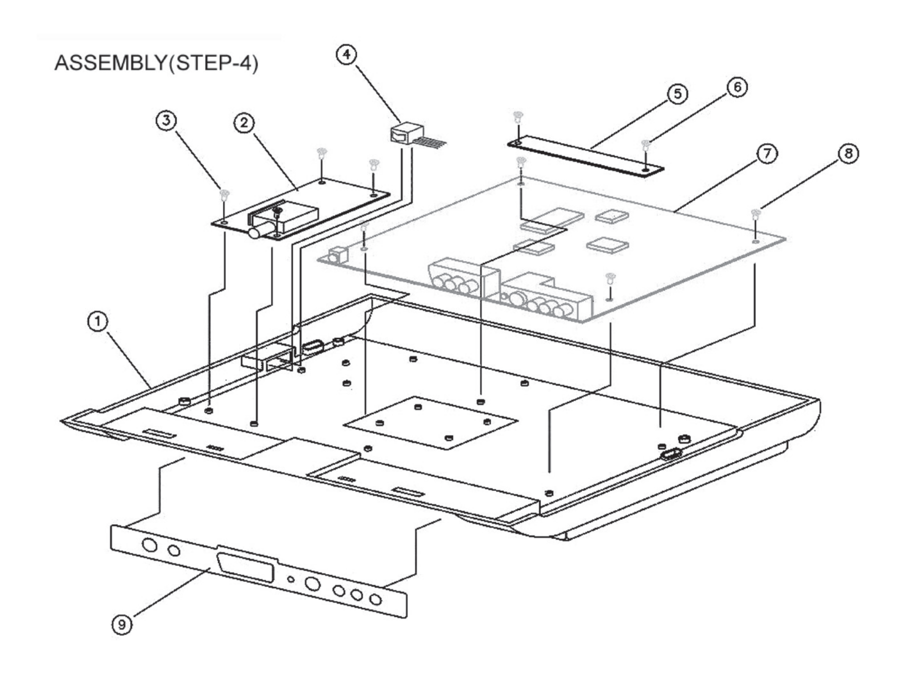
### L10V22 EXPLODED VIEWS

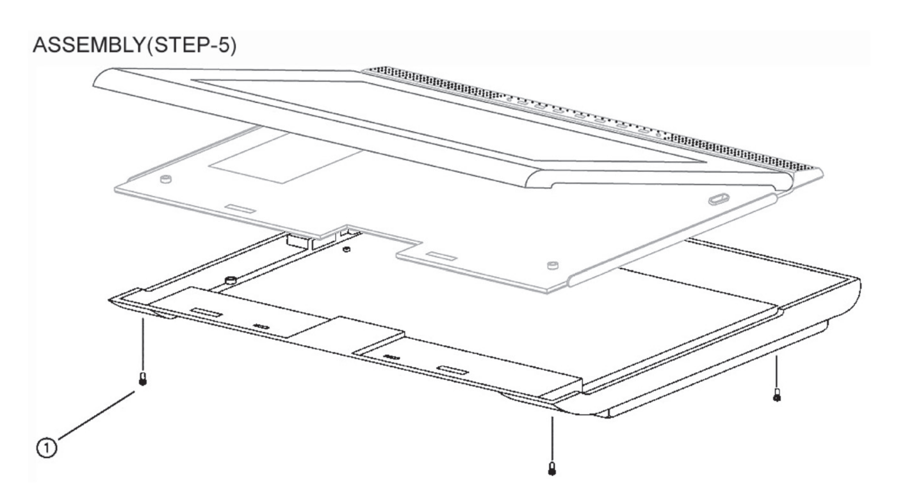





**ASSEMBLY (STEP-1)**

| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 400-001A | FRONT COVER |
| 2 | 405-001A | LOCK BAR |
| 3 | 405-001B | LOCK BAR SWITCH |
| 4 | 410-001E | SCREW PP2*0,4*3 |
| 5 | PANLP104S500 | 10.4" TFT LCD, LP104S5(B2AP) |
| 6 | 406-001A | LOCK SPRING |
| 7 | 401-001A | PANEL COVER |
| 8 | 405-001C | LOCK STOPPER |
| 9 | 410-001A | SCREW PTTB 2.5*7 |
| 10 | 403-00A | HINGE ASSY |
| 11 | 410-001D | SCREW PP 3*6 |

**ASSEMBLY (STEP-2)**

| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 410-001D | SCREW PP 3*6 |
| 2 | 402-002A | BASE COVER |

**ASSEMBLY (STEP-3)**

| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 402-001A | TUNER COVER |
| 2 | 610-001A | SPEAKER |
| 3 | 410-001A | SCREW PTTB 2.5*7 |
| 4 | 408-002A | SENSOR LENS |
| 5 | 404-001A | CONTROL KNOB |
| 6 | AYCOLT10A01A | CONTROL BOARD |
| 7 | 410-001A | SCREW PTTB 2.5*7 |

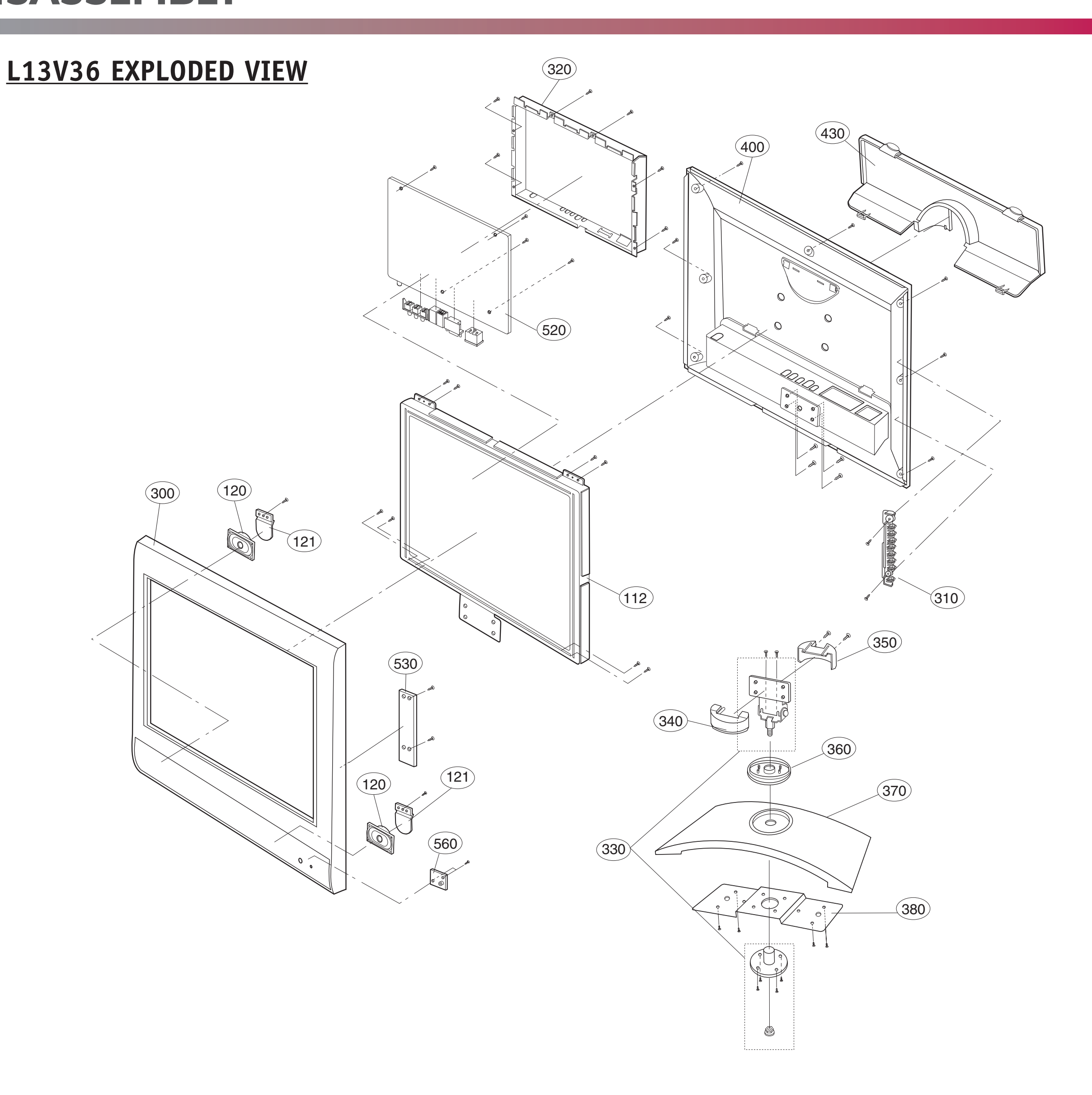
**ASSEMBLY (STEP-4)**

| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 401-002A | BASE BACK |
| 2 | AYIFLT11A01A | TUNER BOARD |
| 3 | 410-001A | SCREW PTTB 2.5*7 |
| 4 | 600-001A | POWER SWITCH |
| 5 | 622-001A | INVERTER ASSY |
| 6 | 410-001A | SCREW PTTB 2.5*7 |
| 7 | AYMALT11A01A | MAIN BOARD |
| 8 | 410-001A | SCREW PTTB 2.5*7 |
| 9 | 450-001A | DECO PLATE |

**ASSEMBLY (STEP-5)**

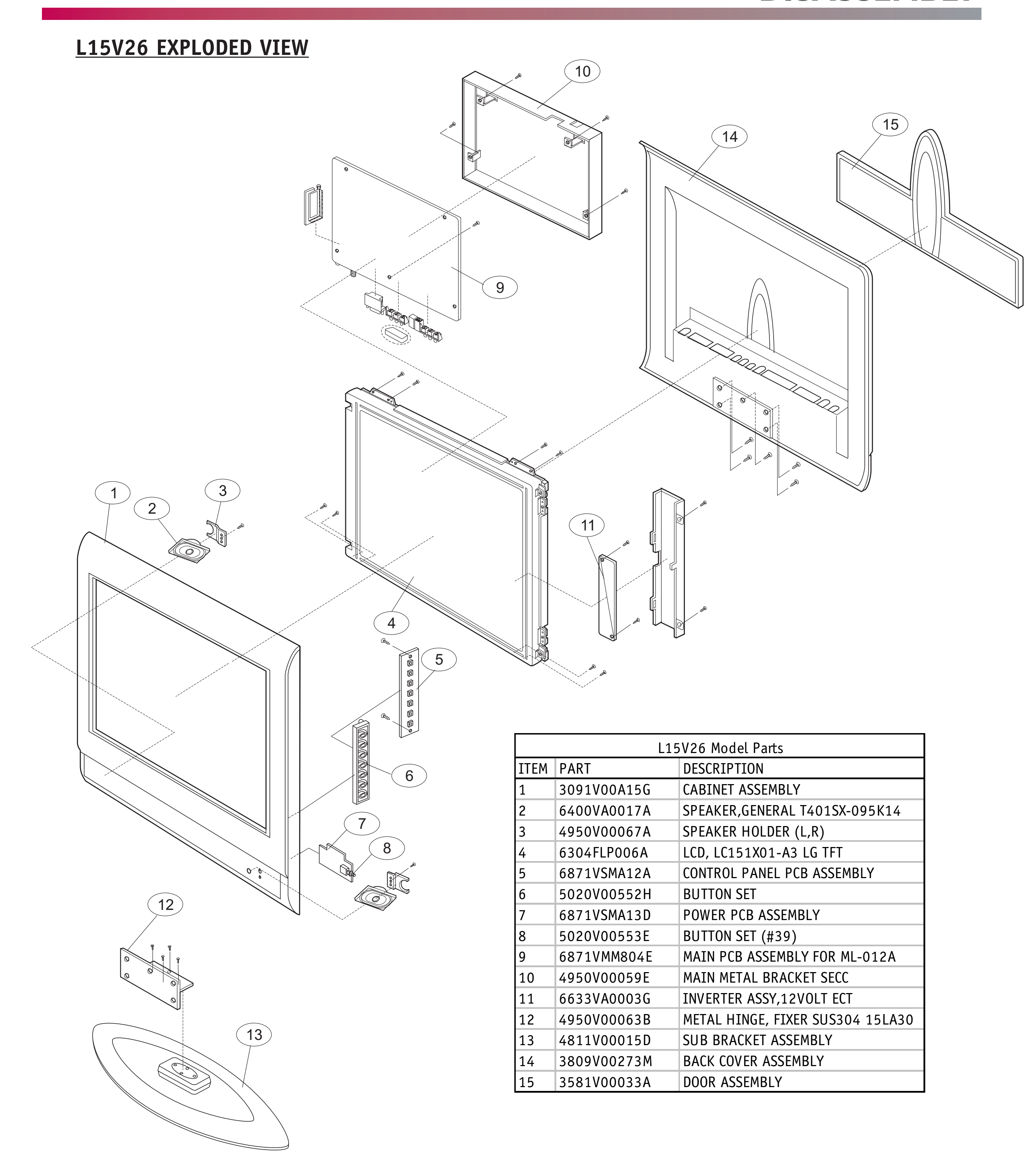
| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 410-001D | SCREW PTTB 3*6 |

## L13V36 EXPLODED VIEW



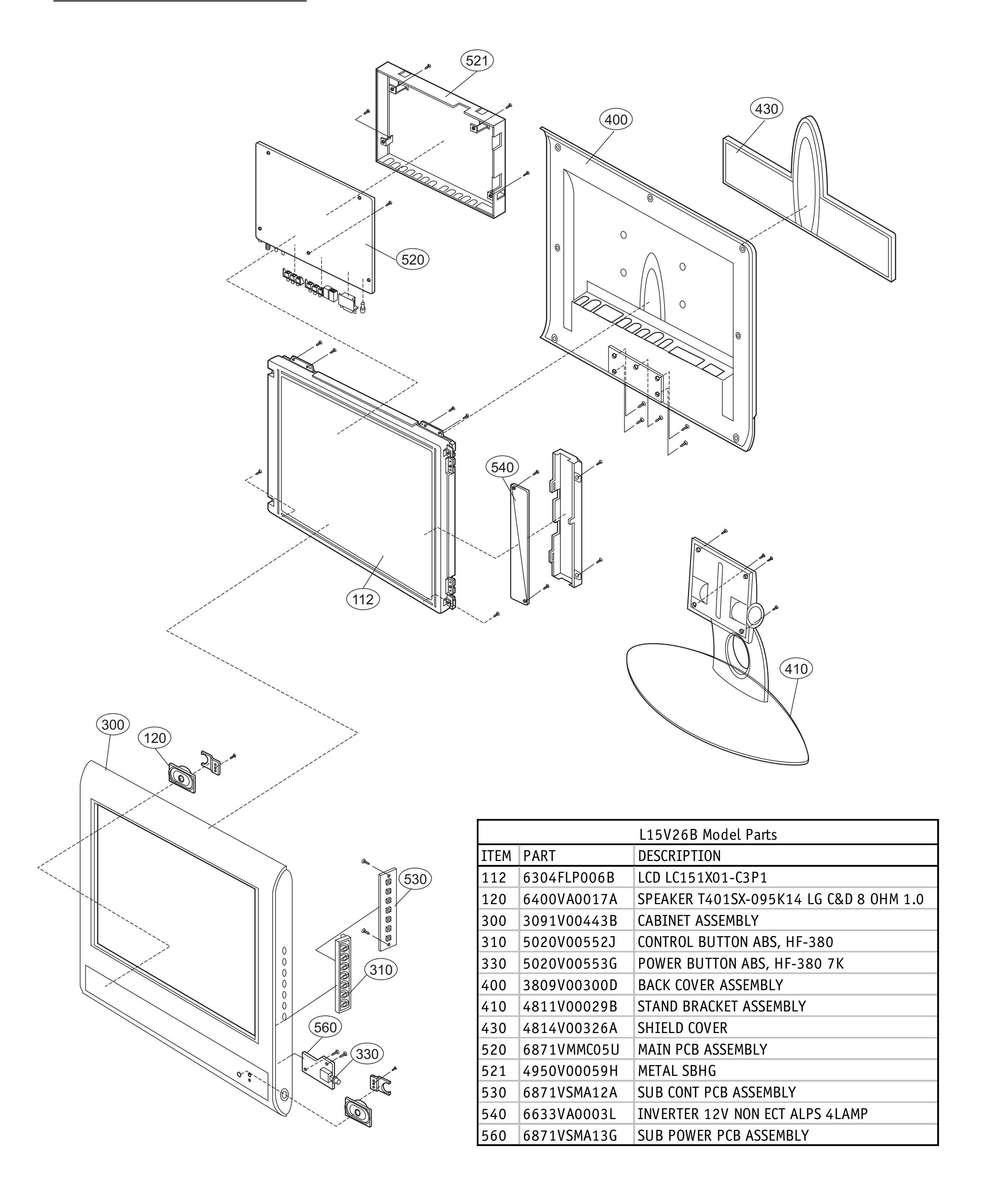

| L13V36 Model Parts | | |
|---|---|---|
| ITEM | PART | DESCRIPTION |
| 120 | 6400VA0017A | SPEAKER,GENERAL T401SX-095K14 8 OHM 1.0/1.5W 81DB |
| 121 | 4950V00170A | METAL,HOLDER SECC(EGI) |
| 300 | 3091V00493B | CABINET ASSEMBLY,RU-13LA60 STEREO ML024C ZENITH |
| 310 | 5020V00778B | BUTTON,CONTROL RU-13LA60 ABS, HF-380 8KEY |
| 320 | 4950V00144B | METAL,FRAME SECC(EGI) RJ-13LA60,PRESS DIE |
| 330 | 4950V00157B | METAL,HINGE ASSY NON RJ-13LA60 |
| 340 | 3550V00300C | COVER,FRONT RJ-13LA60 ABS |
| 350 | 3550V00301C | COVER,REAR RJ-13LA60 ABS HINGE |
| 360 | 4810V00785B | BRACKET,DECO RU-13LA60 NON ABS, HF-380 |
| 370 | 4810V00784C | BRACKET,STAND RJ-13LA60 ML024C ABS |
| 380 | 4950V00161A | METAL,BASE EGI STAND |
| 400 | 3809V00341B | BACK COVER ASSEMBLY,RU-13LA60 NON ZENITH |
| 430 | 3550V00302C | COVER,REAR AV RJ-13LA60 ABS . |
| 520 | 6871VMMQ08A | PCB ASSEMBLY,MAIN ML-024C RU-13LA60 |
| 530 | 6871VSMV23A | PCB ASSEMBLY,SUB CONT ML024C CONTROL 13 |
| 560 | 6871VSMV22A | PCB ASSEMBLY,SUB POWER ML024C POWER 13 |

## L15V26 EXPLODED VIEW



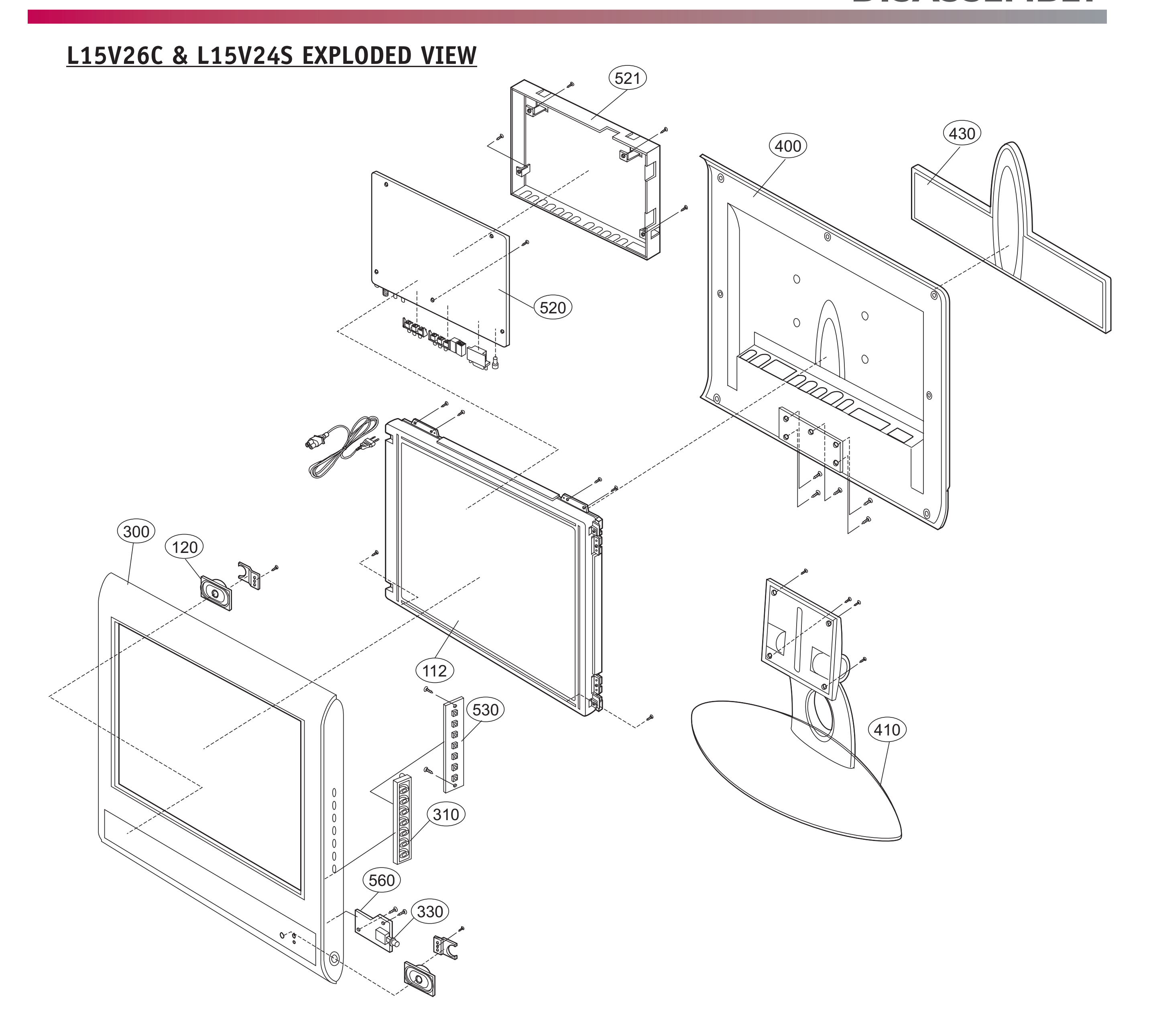

| L15V26 Model Parts | | |
|---|---|---|
| ITEM | PART | DESCRIPTION |
| 1 | 3091V00A15G | CABINET ASSEMBLY |
| 2 | 6400VA0017A | SPEAKER,GENERAL T401SX-095K14 |
| 3 | 4950V00067A | SPEAKER HOLDER (L,R) |
| 4 | 6304FLP006A | LCD, LC151X01-A3 LG TFT |
| 5 | 6871VSMA12A | CONTROL PANEL PCB ASSEMBLY |
| 6 | 5020V00552H | BUTTON SET |
| 7 | 6871VSMA13D | POWER PCB ASSEMBLY |
| 8 | 5020V00553E | BUTTON SET (#39) |
| 9 | 6871VMM804E | MAIN PCB ASSEMBLY FOR ML-012A |
| 10 | 4950V00059E | MAIN METAL BRACKET SECC |
| 11 | 6633VA0003G | INVERTER ASSY,12VOLT ECT |
| 12 | 4950V00063B | METAL HINGE, FIXER SUS304 15LA30 |
| 13 | 4811V00015D | SUB BRACKET ASSEMBLY |
| 14 | 3809V00273M | BACK COVER ASSEMBLY |
| 15 | 3581V00033A | DOOR ASSEMBLY |

## L15V26B EXPLODED VIEW



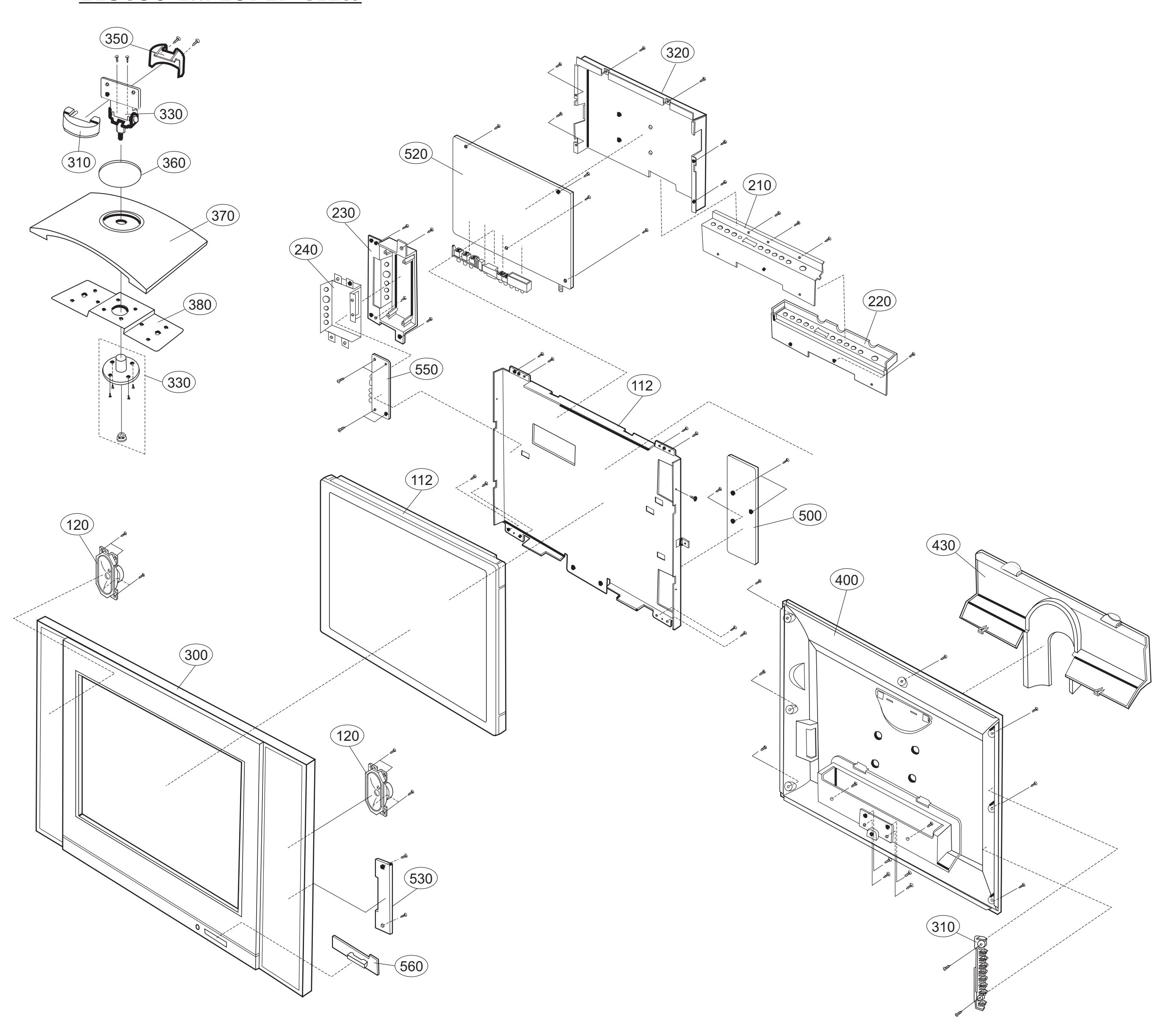

| L15V26B Model Parts | | |
|---|---|---|
| ITEM | PART | DESCRIPTION |
| 112 | 6304FLP006B | LCD LC151X01-C3P1 |
| 120 | 6400VA0017A | SPEAKER T401SX-095K14 LG C&D 8 OHM 1.0 |
| 300 | 3091V00443B | CABINET ASSEMBLY |
| 310 | 5020V00552J | CONTROL BUTTON ABS, HF-380 |
| 330 | 5020V00553G | POWER BUTTON ABS, HF-380 7K |
| 400 | 3809V00300D | BACK COVER ASSEMBLY |
| 410 | 4811V00029B | STAND BRACKET ASSEMBLY |
| 430 | 4814V00326A | SHIELD COVER |
| 520 | 6871VMMC05U | MAIN PCB ASSEMBLY |
| 521 | 4950V00059H | METAL SBHG |
| 530 | 6871VSMA12A | SUB CONT PCB ASSEMBLY |
| 540 | 6633VA0003L | INVERTER 12V NON ECT ALPS 4LAMP |
| 560 | 6871VSMA13G | SUB POWER PCB ASSEMBLY |

## L15V26C & L15V24S EXPLODED VIEW



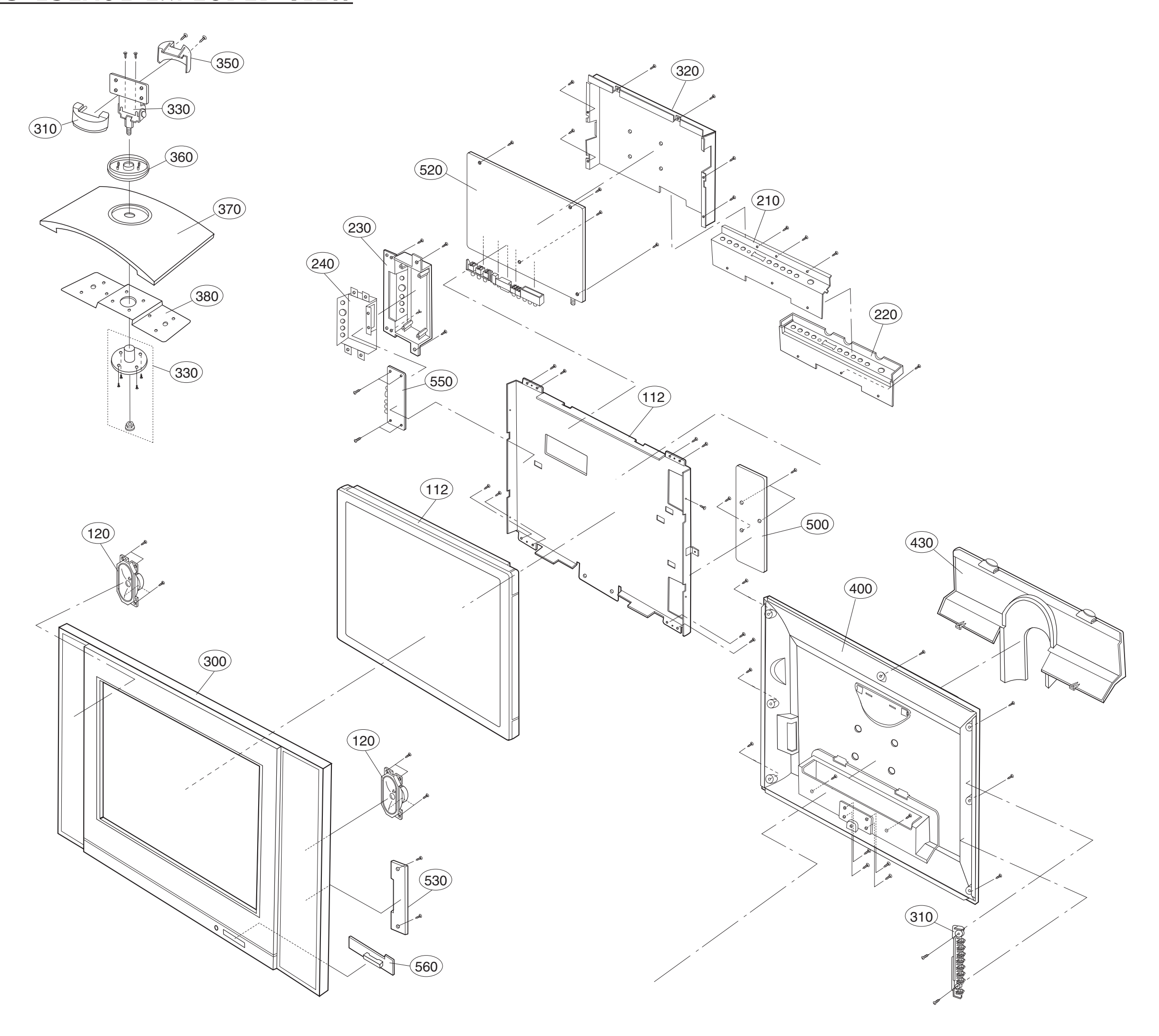

| L15V26C & L15V24S Model Parts | | | |
|---|---|---|---|
| ITEM | L15V24S | L15V26C | DESCRIPTION |
| 112 | 6304FLP006C | 6304FLP006C | LCD MODULE LC151X01-C3M2 |
| 120 | 6400VA0017A | 6400VA0017A | SPEAKER T401SX-095K14 8OHM 1.0/1.5W |
| 300 | 3091V00443A | 3091V00443B | CABINET ASSEMBLY |
| 310 | 5020V00552K | 5020V00552J | 7KEY CONTROL PANEL |
| 330 | 5020V00553H | 5020V00553G | POWER BUTTON |
| 400 | 3809V00300A | 3809V00300B | BACK COVER ASSEMBLY |
| 410 | 4811V00029A | 4811V00029C | MAIN BRACKET ASSEMBLY |
| 430 | 4814V00297A | 4814V00269A | A/V PLATE SHIELD |
| 520 | 6871VMMB86A | 6871VMMN53A | MAIN PCB ASSEMBLY |
| 521 | 4950V00101A | 4950V00101A | MAIN FRAME METAL |
| 530 | 6871VSMA12A | 6871VSMA12A | SUB CONT PCB ASSEMBLY |
| 560 | 6871VSMN38A | 6871VSMN38B | SUB PSW PCB ASSEMBLY POWER |

## L15V36 EXPLODED VIEW



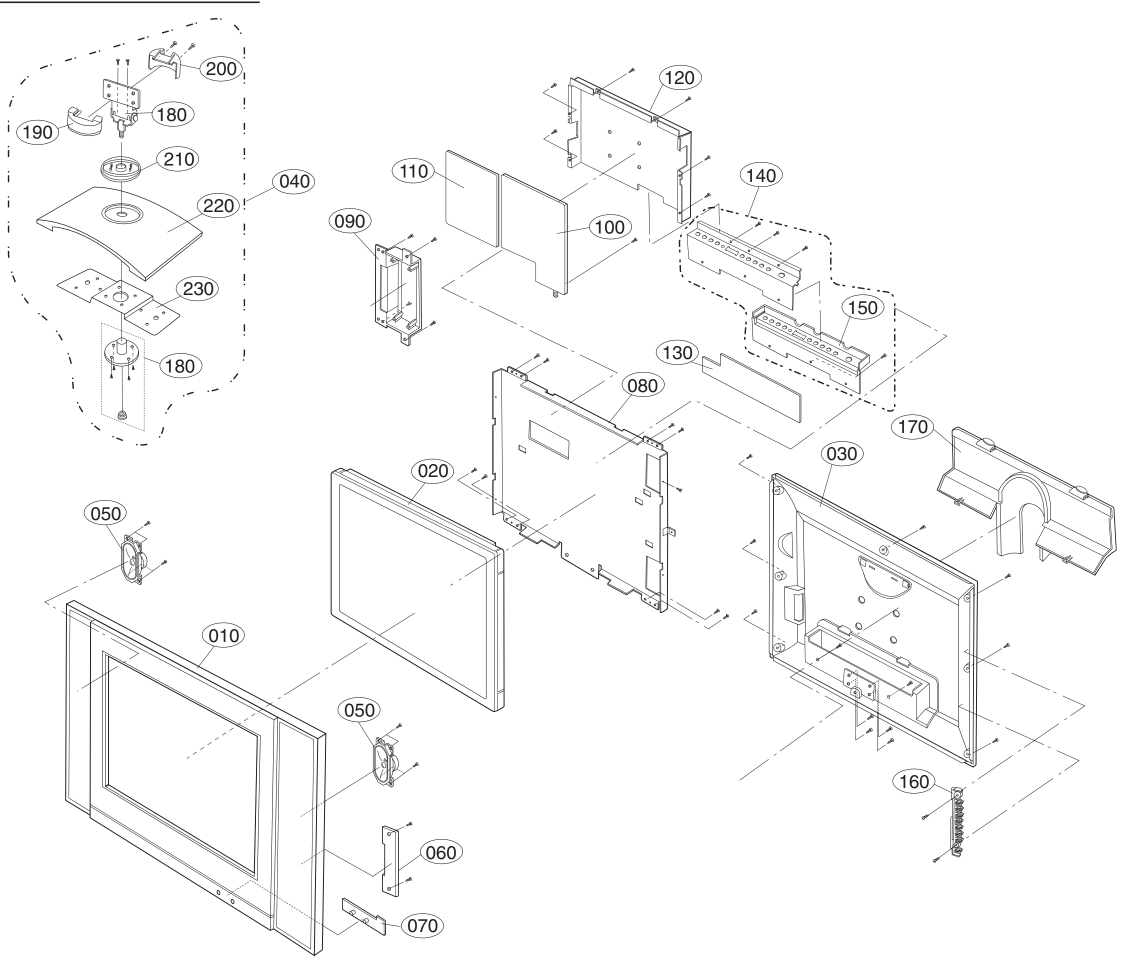

| L15V36 Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 112 | 6306V15001A | LCD MODULE, LC150X01-A3 IPS LG PHILPS | 350 | 4810V00778B | BRACKET, STAND NON ABS, HF-380 |
| 120 | 6400GKTX01A | SPEAKER, F1527C-6428 8OHM 7/12W | 360 | 4810V00776B | BRACKET, DECO NON ABS, HF-380 #102 |
| 210 | 4950V00141B | METAL, SHIELD NON REAR AV 15LA60 | 370 | 4810V00779B | BRACKET, STAND NON ABS, HF-380 . |
| 220 | 4810V00764C | BRACKET, REAR AV ML012B HIPS 40AF | 380 | 4950V00135A | METAL, STAND NON BASE, 15LA60 |
| 230 | 4810V00765C | BRACKET, SIDE AV ML012B HIPS 40AF | 400 | 3809V00338D | BACK COVER ASSEMBLY, RU-15LA60 NON . |
| 240 | 4950V00142A | METAL, SHIELD, 20LA60/15LA60 | 430 | 3550V00298B | COVER, REAR 15LA60 HIPS 60HR . |
| 250 | 4950V00134A | METAL, MAIN FRAME NON 15LA60 | 520 | 6871VMMQ13A | PCB, MAIN ML012B RU-15LA60 |
| 300 | 3091V00490D | CABINET ASSEMBLY, STEREO ML012B | 530 | 6871VSMV38A | PCB, SUB CONT RZ-15/20LA60 CTRL ASSY |
| 310 | 5020V00777B | BUTTON, CONTROL 15LA60, HF-380 7KEY | 540 | 6633VA0003N | INVERTER, 12V NON ECT ALPS500 |
| 320 | 4950V00140A | METAL, SHIELD NON 15LA60 | 550 | 6871VSMV40C | PCB, SUB A/V RU-15/20LA60 SIDE A/V ASSY |
| 330 | 4950V00157A | METAL, STAND NON HINGE ASSY_15LA60 | 560 | 6871VSMV43B | PCB, SUB ML012B 15 INDEX LED ASSY |
| 340 | 4810V00777B | BRACKET, STAND NON ABS, HF-380 FRONT | | | |

## RU-15LA61 EXPLODED VIEW



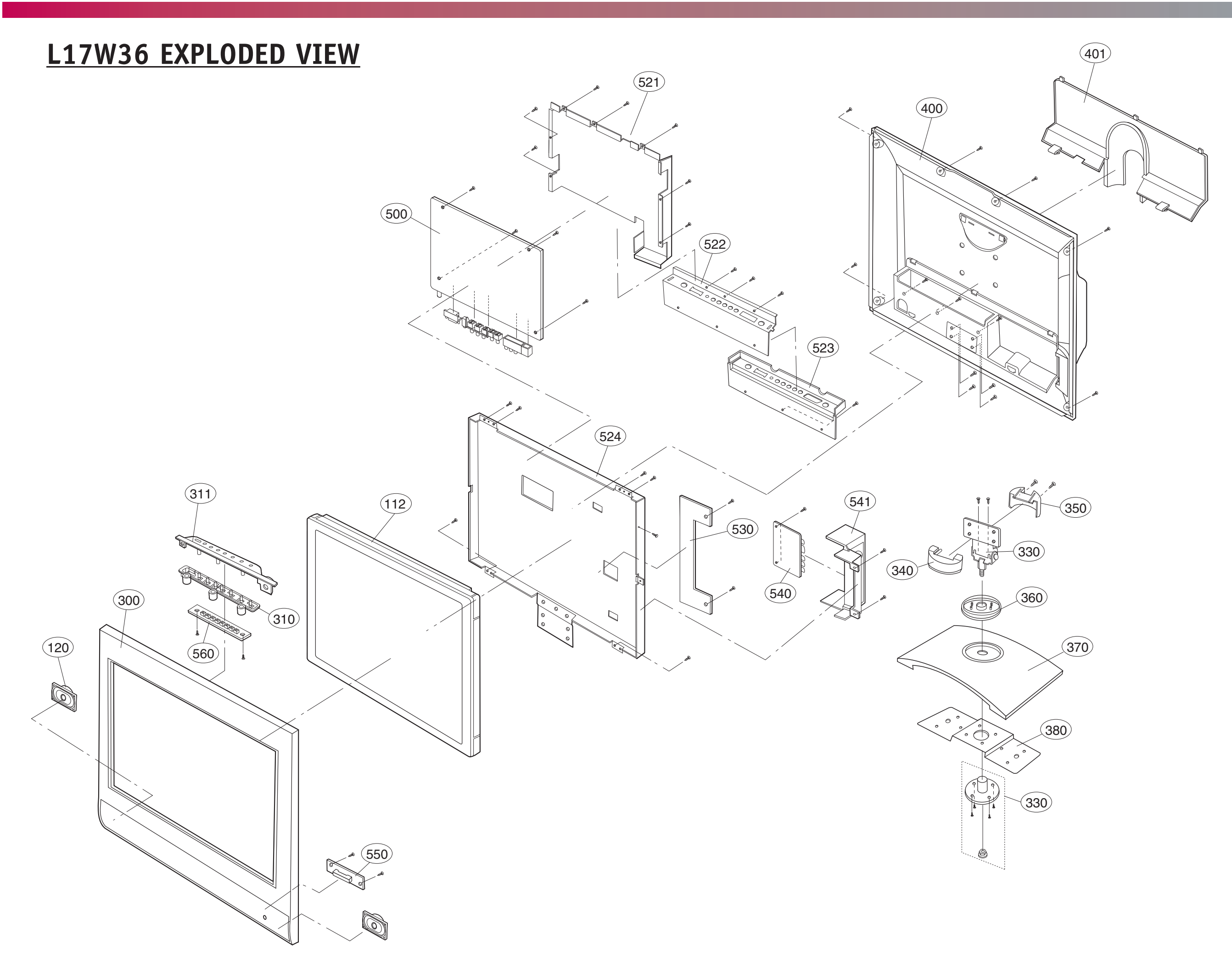

| RU-15LA61 Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 112 | 6306V15001A | LCD MODULE LC150X01-A3 | 340 | 4810V00777D | BRACKET,STAND ML012C HIPS 60HR FRONT |
| 120 | 6400GKTX01A | SPEAKER, F1527C-6428 8OHM 7/12W | 350 | 4810V00778D | BRACKET,STAND ML012C HIPS 60HR REAR |
| 210 | 4950V00141B | METAL,SHIELD NON REAR AV 15LA60 | 360 | 4810V00776C | BRACKET,DECO ML012C ABS, HF-380 |
| 220 | 4810V00764G | BRACKET,REAR AV ML012C HIPS 40AF | 370 | 4810V00779C | BRACKET,STAND ML012C ABS, HF-380 BASE |
| 230 | 4810V00765F | BRACKET,SIDE AV ML012C HIPS 40AF | 380 | 4950V00135A | METAL,STAND NON BASE, 15LA60 |
| 240 | 4950V00142A | METAL,SHIELD NON SIDE AV, 20LA60/15LA60 | 400 | 3809V00338E | BACK COVER ASSEMBLY,RU-15LA61 NON |
| 250 | 4950V00134A | METAL,MAIN FRAME NON 15LA60 | 430 | 3550V00298C | COVER,REAR AV RU-15LA61 ABS, HF-380 |
| 300 | 3091V00490E | CABINET ASSEMBLY,STEREO FOR CANADA | 520 | 6871VMMQ13A | PCB ASSEMBLY,MAIN ML012C RU-15LA60 |
| | 3091V00490K | CABINET ASSEMBLY,RU-15LA61.AAPLKZ | 530 | 6871VSMV38A | PCB ASSEMBLY,SUB CONT ML012B CONTROL ASSY |
| 310 | 5020V00777C | BUTTON, CONTROL ABS, HF-380 8KEY | 540 | 6633VA0003N | INVERTER ,12V NON ECT ALPS500 6633VA00003 |
| 320 | 4950V00140A | METAL, SHIELD | 550 | 6871VSMV40J | PCB ASSEMBLY,SUB ML012B SIDE A/V |
| 330 | 4950V00157A | METAL, STAND HINGE | 560 | 6871VSMV43D | PCB ASSEMBLY,SUB ML012C 15INDEX LED ASSY |

## 15LA6R EXPLODED VIEW



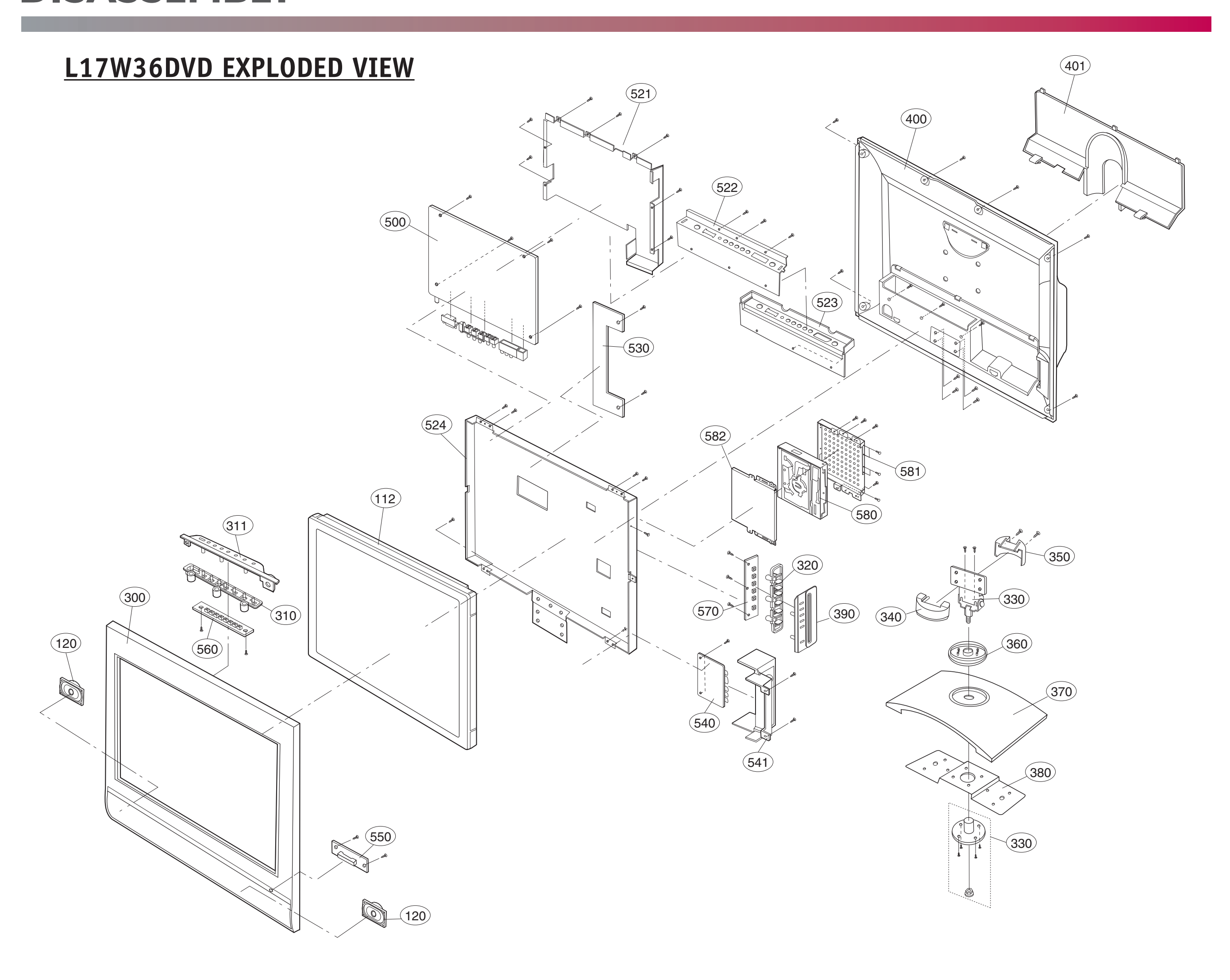

| 15LA6R Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 10 | 3091TKB050D | CABINET, RM-15LA67 3090V00444 CANADA | 110 | 6871TPT281E | PCB,POWER 15(LPL,CMO,HYDIS) & L173SAB(MFM) |
| | 3091TKB050E | CABINET, 3090V00444 CANADA SKD | | or 6871TPT281A | PCB,POWER, RZ-15LA70 POWER FOR CMO/LPL/HD |
| 20 | 6304FLP212A | LCD, LC150X02-A4K2 LG PHILPS LEAD FREE | 120 | 4950TKS300B | METAL, SHIELD 15LA66 |
| | 6304FLP133B | LCD, LC150X02-A4 LG PHILPS | | 4950TKS300A | METAL, SHIELD 15LA66 C/SKD |
| 30 | 3809TKB029K | BACK COVER, 3808V00368 CANADA | 130 | 6871TST561A | PCB, SUB RM-20LA70 ML041B JACK(DVD) BOARD ASSY |
| | 3809TKB029L | BACK COVER, 3808V00368 CANADA SKD | | 6871TST964A | PCB, SUB RM/RT-15,17,20 DVD JACK BOARD VIDEO |
| 40 | 3043TKK174B | TILT SWIVEL ASSEMBLY | 140 | 3551TKK537D | COVER, RT-15LA66 REAR A/V PHONE ML041B |
| 50 | 6400GKTX01C | SPEAKER, F1527C-6428-4 40*70MM | 150 | 4810V00925G | BRACKET, REAR AV HIPS 407AF 70B |
| 60 | 6871TST633A | PCB,SUB, RM-15LA66 CONTROL BOARD | 160 | 5020V00777C | BUTTON, CONTROL RU-15LA61 ABS, HF-380 8KEY |
| | 6871TST977A | PCB, SUB 15/20LA66 CONTROL | 170 | 3550V00298B | COVER, REAR 15LA60 HIPS 60HR |
| 70 | 6871TST635A | PCB, SUB ML-041B IR | 180 | 4950V00157A | METAL, STAND NON HINGE _15LA60 |
| | 6871TST969A | PCB, SUB IR BOARD LED & P/SW | 190 | 4810V00777D | BRACKET, STAND RU-15LA61 ML012C HIPS 60HR FRONT |
| 80 | 4951TKS168A | METAL FRAME, MAIN LPL MODULE | 200 | 4810V00778D | BRACKET, STAND RU-15LA61 ML012C HIPS 60HR REAR |
| | 4951TKS168B | METAL FRAME, MAIN C/SKD LPL MODULE | 210 | 4810V00776C | BRACKET, DECO RU-15LA61 ML012C ABS, HF-380 |
| 90 | 4810V00950B | BRACKET, AV RZ-20LA62 ML024A 60HR | 220 | 4810V00779C | BRACKET, STAND RU-15LA61 ML012C ABS, HF-380 BASE |
| 100 | 3313TN1008A | MAIN TOTAL ASSEMBLY, ML-041B | 230 | 4950V00135A | METAL, STAND NON BASE, 15LA60 |

## L17W36 EXPLODED VIEW



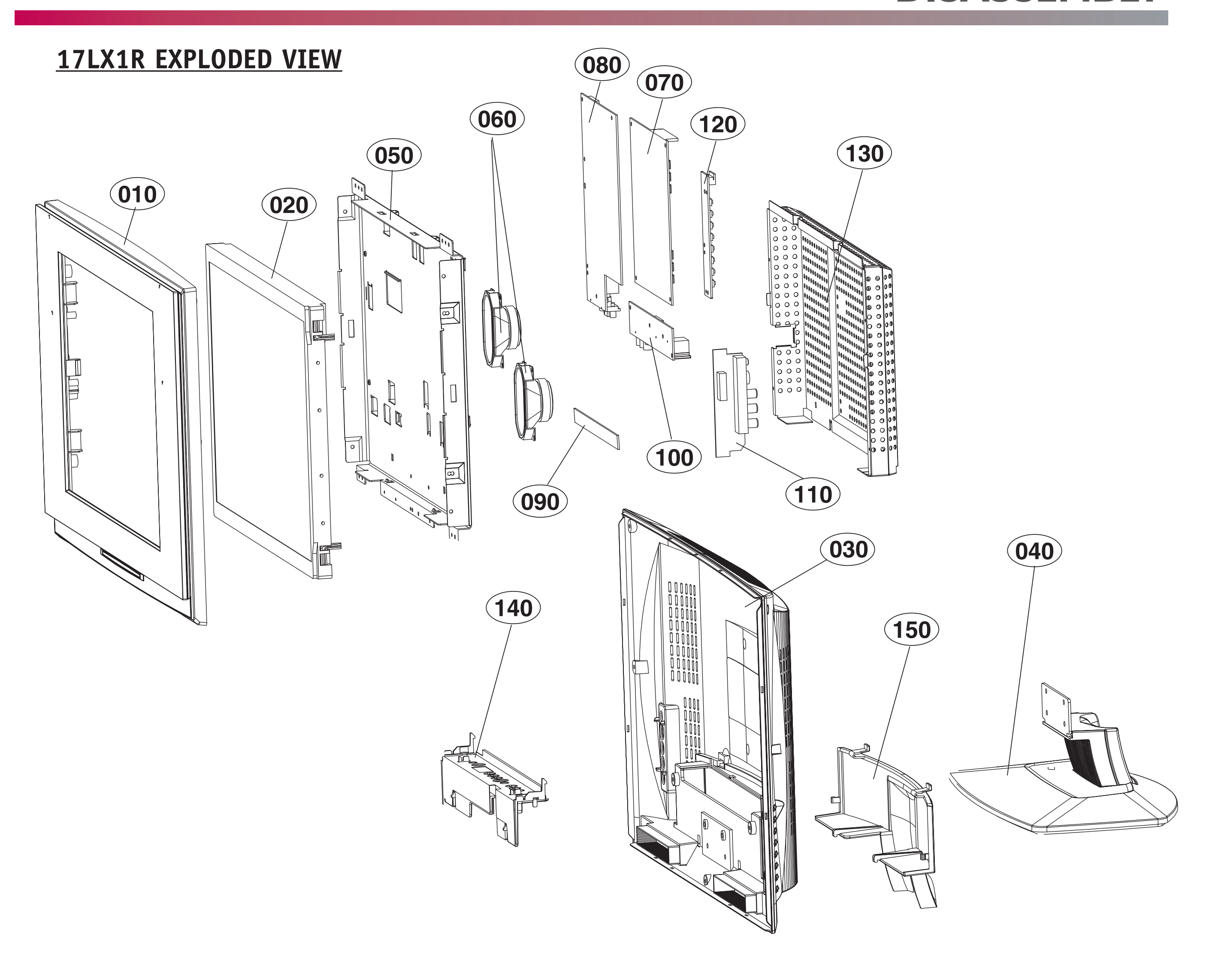

| L17W36 Model Parts | | |
|---|---|---|
| ITEM | PART | DESCRIPTION |
| 112 | 6306V17001A | LCD MODULE, LC171W03-A4 LG PHILPS TFT COLOR TFT LCD MODULE |
| 120 | 6400GKTX01A | SPEAKER, FULLRANGE F1527C-6428 (GENERAL) 8OHM 7/12W 83DB |
| 300 | 3091V00535A | CABINET ASSEMBLY, RU-17LZ20 NON ML027C . |
| 310 | 5020V00798A | BUTTON, CONTROL 17LZ20 ABS 8KEY |
| 311 | 4810V00836A | BRACKET, CONTROL 17LZ20 |
| 330 | 4950V00157A | METAL, STAND NON HINGE ASSY_15LA60 |
| 340 | 4810V00777A | BRACKET, STAND 15LA60 ML012B NON HINGE FRONT |
| 350 | 4810V00778A | BRACKET, STAND 15LA60 ML012B NON HINGE COVER |
| 360 | 4810V00776A | BRACKET, DECO 15LA60 ML012B NON STAND DECO. |
| 370 | 4810V00779A | BRACKET, STAND 15LA60 ML012B NON BASE |
| 380 | 4950V00135A | METAL, STAND NON BASE, 15LA60 |
| 400 | 3809V00371A | BACK COVER ASSEMBLY, RU-17LZ20 |
| 401 | 3550V00335A | COVER, REAR AV 17LZ20 ABS, HF-380 |
| 500 | 3141VMNQ35A | CHASSIS ASSEMBLY, MAIN ML027C |
| 521 | 4950V00168A | METAL, SHIELD |
| 522 | 4950V00151B | METAL, SHIELD ET |
| 523 | 3500V00067E | BOARD, AV RU-17LZ20 ML027C . |
| 524 | 4950V00167A | METAL, FRAME |
| 530 | 6633VA0003R | INVERTER ASSEMBLY, 15V NON ECT 6LAMP CIU11-K004 |
| 540 | 6871VSMW58A | PCB ASSEMBLY, SUB ML027C SIDE A/V |
| 541 | 4810V00838A | BRACKET, SIDE AV 17LZ20 |
| 550 | 6871VSMW59A | PCB ASSEMBLY, SUB WINDO ML027C INDEX ASSY |
| 560 | 6871VSMW57A | PCB ASSEMBLY, SUB CONT ML027C ASSY |

## L17W36DVD EXPLODED VIEW



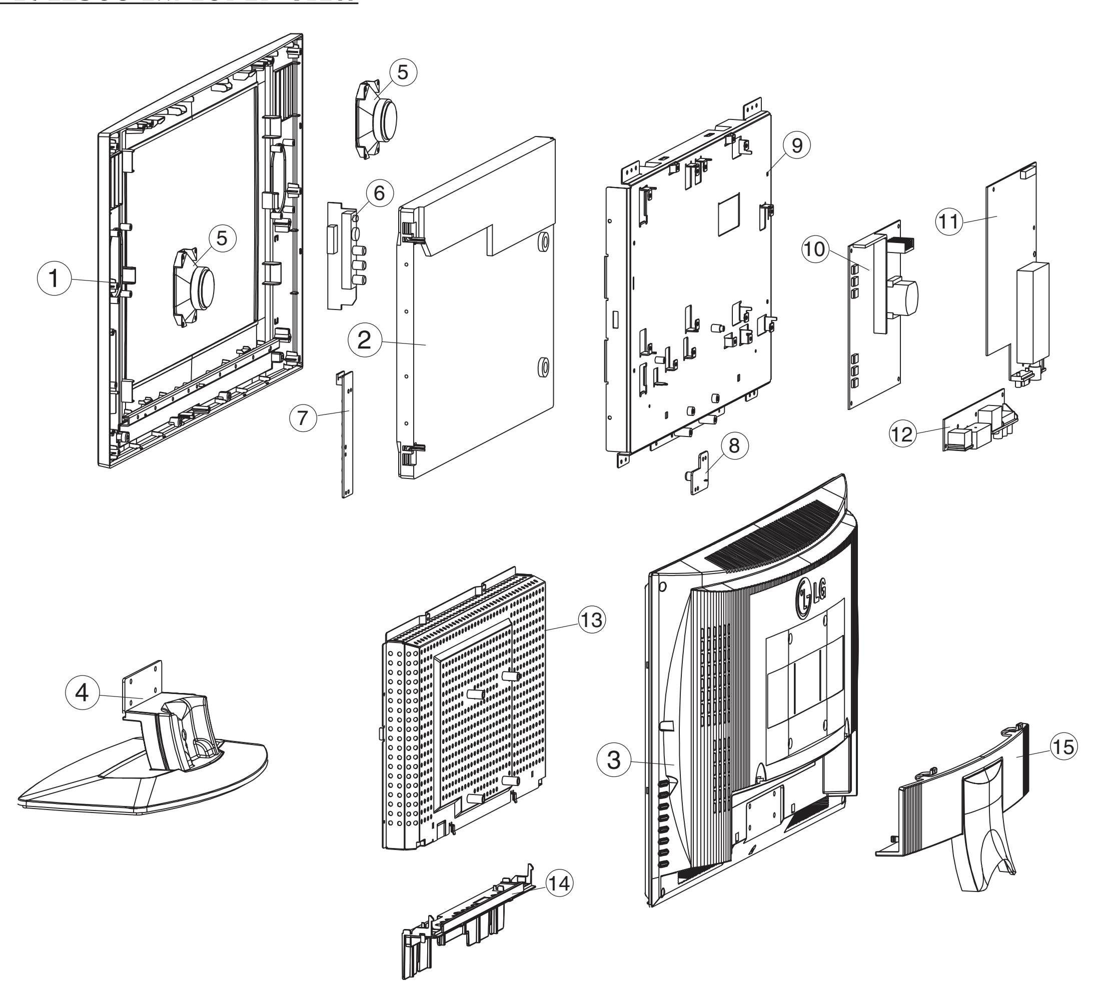

| L17W36DVD Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 112 | 6306V17001A | LCD MODULE,LC171W03-A4 LG-PHILPS | 500 | 6871VMMQ91A | PCB ASSEMBLY,MAIN ML-027B ASSY |
| 120 | 6400GKTX01A | SPKR, F1527C-6428 8OHM 7/12W 83DB | 521 | 4950V00168B | METAL,SHIELD NON FOR DVD |
| 300 | 3091V00535C | CABINET ASSEMBLY,KU-17LZ21 ML027B | 522 | 4950V00191A | METAL,SHIELD ET KZ-17LZ21 |
| 310 | 5020V00798A | BUTTON,CONTROL 17LZ20 ABS 8KEY NON | 523 | 4810V00896B | BRACKET,REAR AV KU-17LZ21 HIPS 40AF |
| 311 | 4810V00836A | BRACKET,CONTROL 17LZ20 NON NON NON | 524 | 4950V00167F | METAL,FRAME EGI |
| 320 | 5020V00799A | BUTTON,CONTROL 17LZ21 ABS NON NON | 530 | 6633VA0003V | INVERTER,15V 6LAMP 03T VE FRONTEC |
| 330 | 4950V00157A | METAL,STAND NON HINGE ASSY_15LA60 | 540 | 6871VSMW84A | PCB ASSY,SUB A/V KZ-17LZ21 SIDE A/V |
| 340 | 4810V00777A | BRACKET,STAND 15LA60 FRONT | 541 | 4810V00838K | BRACKET,SIDE AV KU-17LZ21 HIPS 40AF |
| 350 | 4810V00778A | BRACKET,STAND 15LA60 COVER | 550 | 6871VSMX76A | PCB ASSEMBLY,SUB LED INDEX |
| 360 | 4810V00776A | BRACKET,DECO 15LA60 NON STAND | 560 | 6871VSMW86B | PCB ASSEMBLY,SUB CTL TV CONTROL |
| 370 | 4810V00779E | BRACKET,STAND NON ABS, HF-380 | 570 | 6871VSMW85B | PCB ASSEMBLY,SUB CTL DVD CONTROL |
| 380 | 4950V00135A | METAL,STAND NON BASE, 15LA60 | 580 | 4405V00002B | DVD-ROM,DSV-810-MMA-BBE22 DVS KOREA |
| 390 | 4810V00837B | BRACKET,CONTROL 60HR FOR DVD | 581 | 4950V00200B | METAL,SHIELD EGI DVD TOP PRESS |
| 400 | 3809V00371D | BACK COVER, KU-17LZ21 NON WITH DVD | 582 | 4950V00201B | METAL,SHIELD EGI DVD BOTTOM PRESS |
| 401 | 3550V00335A | COVER,REAR AV 17LZ20 ABS, HF-380 NON | | | |

## 17LX1R EXPLODED VIEW



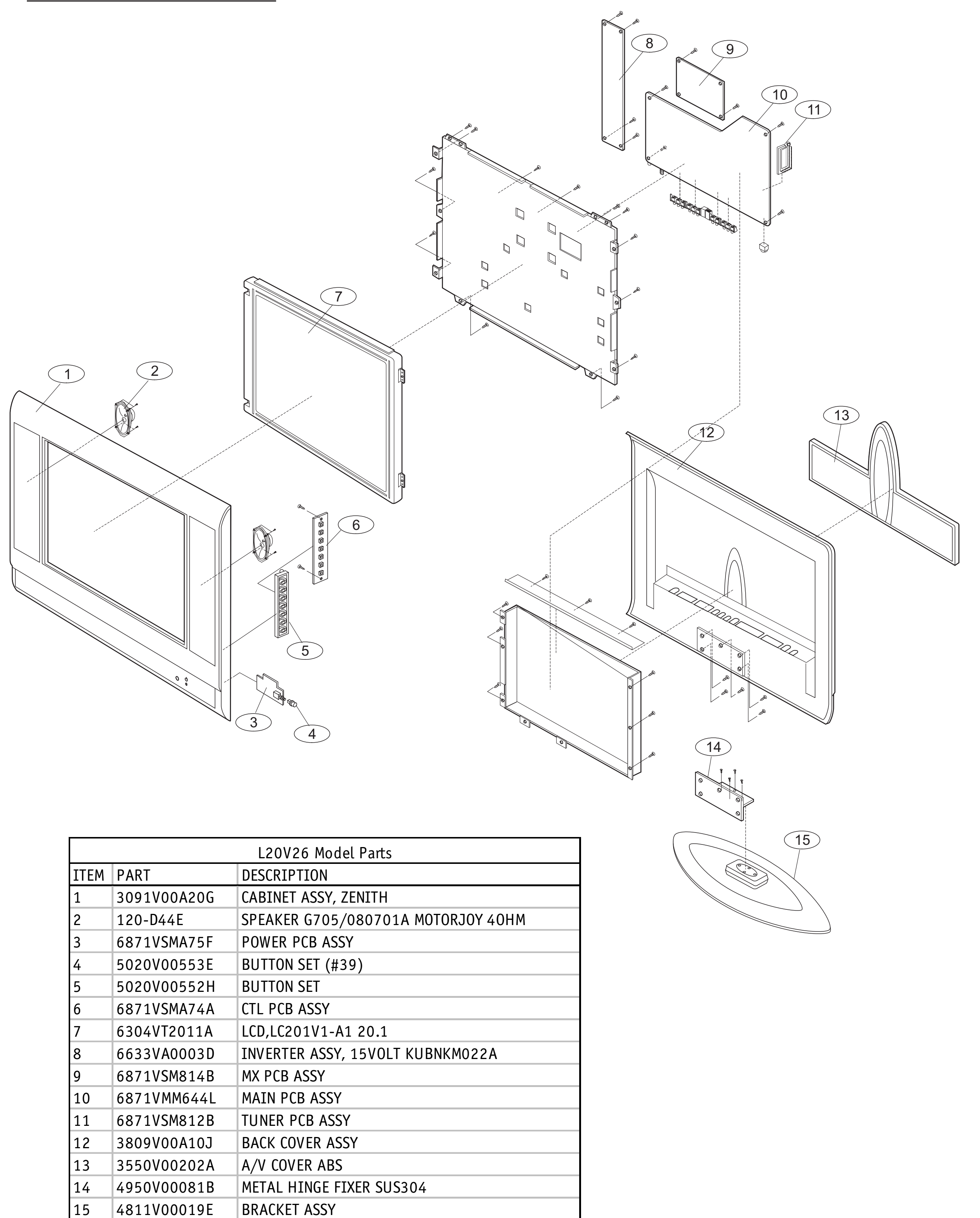

| 17LX1R Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 10 | 3091TKC146A | CABINET ASSEMBLY, 3090TKC106 NON | 70 | 6871TPT280L | PCB,POWER, RZ-17LA60 LPL 17 WIDE PB FREE |
| | 3091TKC146B | CABINET ASSEMBLY, 3090TKC106 C/SKD | | or 6871TPT280C | PCB,POWER, 17RZ40 LIPS FOR LPL 17" WIDE |
| 20 | 6304FLP213ALCD | LCD, LC171W03-A4KJ LEAD FREE(TV) | 80 | 3313TN1033A | MAIN BOARD, 17LX1R-UA |
| | or 6306V17001B | LCD, LC171W03-A4K4 | 90 | 6871TSTA04A | PCB,SUB, 17LX1 IR BOARD LED & P/SW |
| | or 6304FLP140B | LCD, LC171W03-A4K7,450NITS,25MS,6LAMP | 100 | 6871TST964A | PCB,SUB, RM/RT-15,17,20 DVD JACK BOARD |
| 30 | 3809TKC061S | BACK COVER, 3808TKC051 ML-041B | 110 | 6871TST995A | PCB,SUB, 17LX1R SIDE A/V |
| | 3809TKC061T | BACK COVER, 3808TKC051 ML-041B C/SKD | 120 | 6871TST976B | PCB,SUB, 17LX1R-UA CONTROL |
| 40 | 3043TKK179G | TILT SWIVEL, 17LX1R NOBLE BLACK (NO PRINT) | 130 | 4951TKK173C | REAR SHIELD RZ-17LZ50 EMI-SPONGE |
| | 3043TKK179H | TILT SWIVEL, NOBLE BLACK C/SKD(NO PRINT) | | 4951TKK173D | REAR SHIELD RZ-17LZ50 EMI-SPONGE C/SKD |
| 50 | 4951TKS154D | METAL FRAME ML-041B | 140 | 3551TKK529G | COVER ASSEMBLY, REAR A/V |
| | 4951TKS154E | METAL FRAME ML-041B C/SKD | 150 | 3550TKK543B | COVER, 17LX1R REAR AV |
| 60 | 6400GKTX01C | SPEAKER,F1527C-6428-4 40*70MM | | | |

## RU-17LZ50C EXPLODED VIEW




| RU-17LZ50C Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 1 | 3091TKC120G | CABINET,3090TKC092 ML-041B C/SKD | 9 | 4951TKS154C | METAL FRAME RZ-17LZ50 C/AKD |
| | 3091TKC120H | CABINET, 3090TKC092 ML-041B C/SKD | | 4951TKS154B | METAL FRAME RM-17LZ50C |
| | 3091TKC120F | CABINET, 3090TKC092 ML-041B | 10 | 6871TPT280C | PCB,POWER, 17RZ40 LIPS FOR LPL 17" WIDE |
| 2 | 6306V17001B | LCD, LC171W03-A4K4 LG PHILPS | 11 | 3313TN1016B | MAIN PCB, RM-17LZ40 LPL VER 1.1 |
| | or 6304FLP140 | LCD, LC171W03-A4K7 LG PHILPS | | 3313TN1023B | MAIN PCB, LPL COMMERCIAL RM-17LZ50C |
| 3 | 3809TKC061L | BACK COVER, ML-041B USA C/SKD | 12 | 6871TST561A | PCB,SUB, JACK(DVD) BOARD ASSY |
| | 3809TKC061M | BACK COVER, NORTH AMERICA COMMERCIAL | | 6871TST733A | PCB,SUB, JACK ASSY BOARD |
| 4 | 3043TKK179D | TILT SWIVEL, RM-17LZ50 WITHOUT PRINT | 13 | 4951TKK173B | REAR SHIELD RZ-17LZ50 C/SKD |
| | 3043TKK179C | TILT SWIVEL, 4810TKK234 WITHOUT PRINT | | 4951TKK173C | REAR SHIELD RZ-17LZ50 EMI-SPONGE |
| 5 | 6400GKTX01C | SPEAKER, F1527C-6428-4 40*70MM | 14 | 3551TKK529D | COVER,REAR A/V ASSY HIPS-40AF |
| 6 | 6871TST618A | PCB,SUB, SIDE_AV | | 3551TKK529E | COVER, REAR A/V ASSY COMMERCIAL |
| 7 | 6871TST616A | PCB ,SUB, CONTROL BOARD ASSY | 15 | 3550TKK543A | COVER, 17LZ50 REAR AV |
| 8 | 6871TST617A | PCB, SUB, IR B/D ASSY | | | |

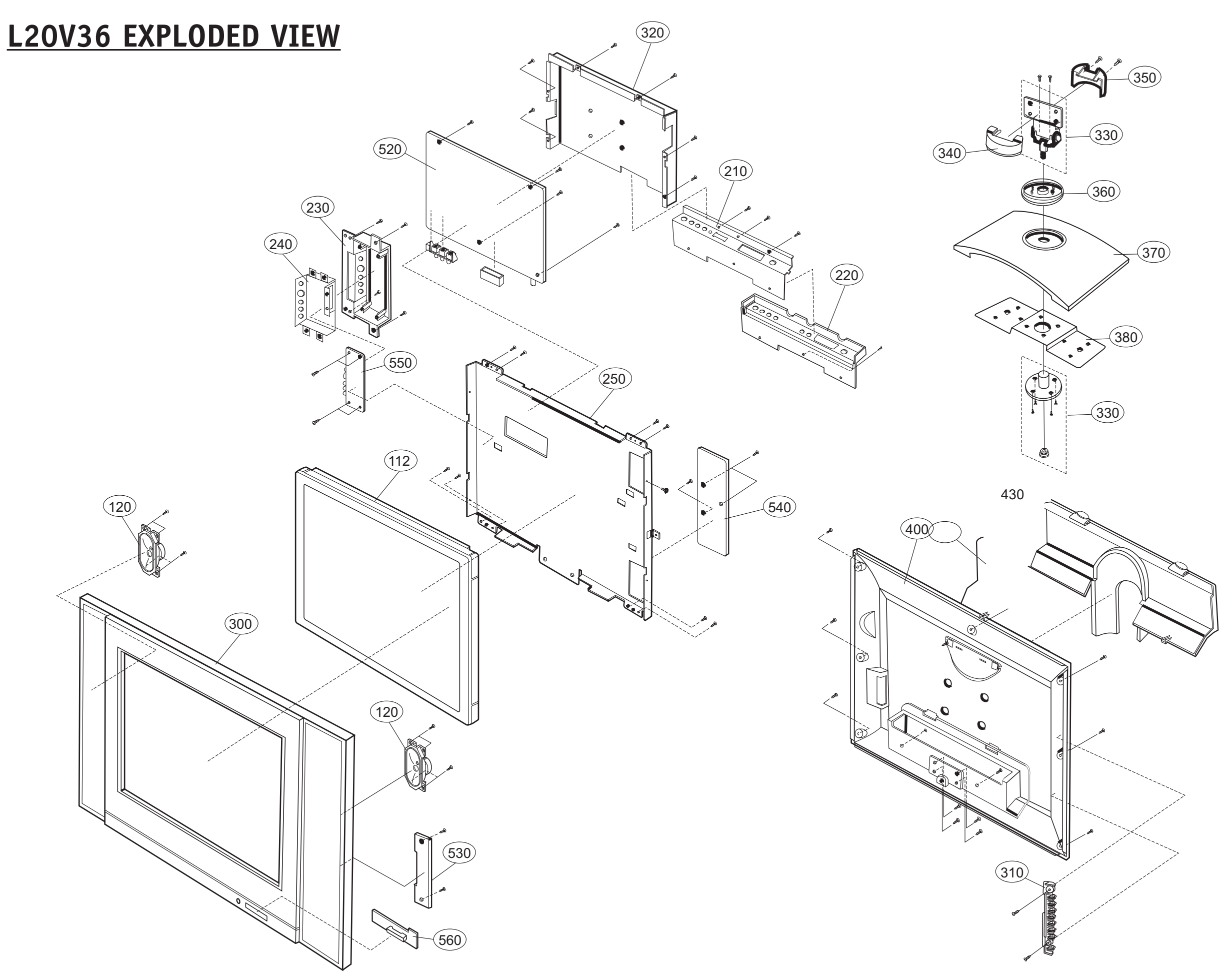
## L20V26 EXPLODED VIEW




| L20V26 Model Parts | | |
|---|---|---|
| ITEM | PART | DESCRIPTION |
| 1 | 3091V00A20G | CABINET ASSY, ZENITH |
| 2 | 120-D44E | SPEAKER G705/080701A MOTORJOY 4OHM |
| 3 | 6871VSMA75F | POWER PCB ASSY |
| 4 | 5020V00553E | BUTTON SET (#39) |
| 5 | 5020V00552H | BUTTON SET |
| 6 | 6871VSMA74A | CTL PCB ASSY |
| 7 | 6304VT2011A | LCD,LC201V1-A1 20.1 |
| 8 | 6633VA0003D | INVERTER ASSY, 15VOLT KUBNKM022A |
| 9 | 6871VSM814B | MX PCB ASSY |
| 10 | 6871VMM644L | MAIN PCB ASSY |
| 11 | 6871VSM812B | TUNER PCB ASSY |
| 12 | 3809V00A10J | BACK COVER ASSY |
| 13 | 3550V00202A | A/V COVER ABS |
| 14 | 4950V00081B | METAL HINGE FIXER SUS304 |
| 15 | 4811V00019E | BRACKET ASSY |

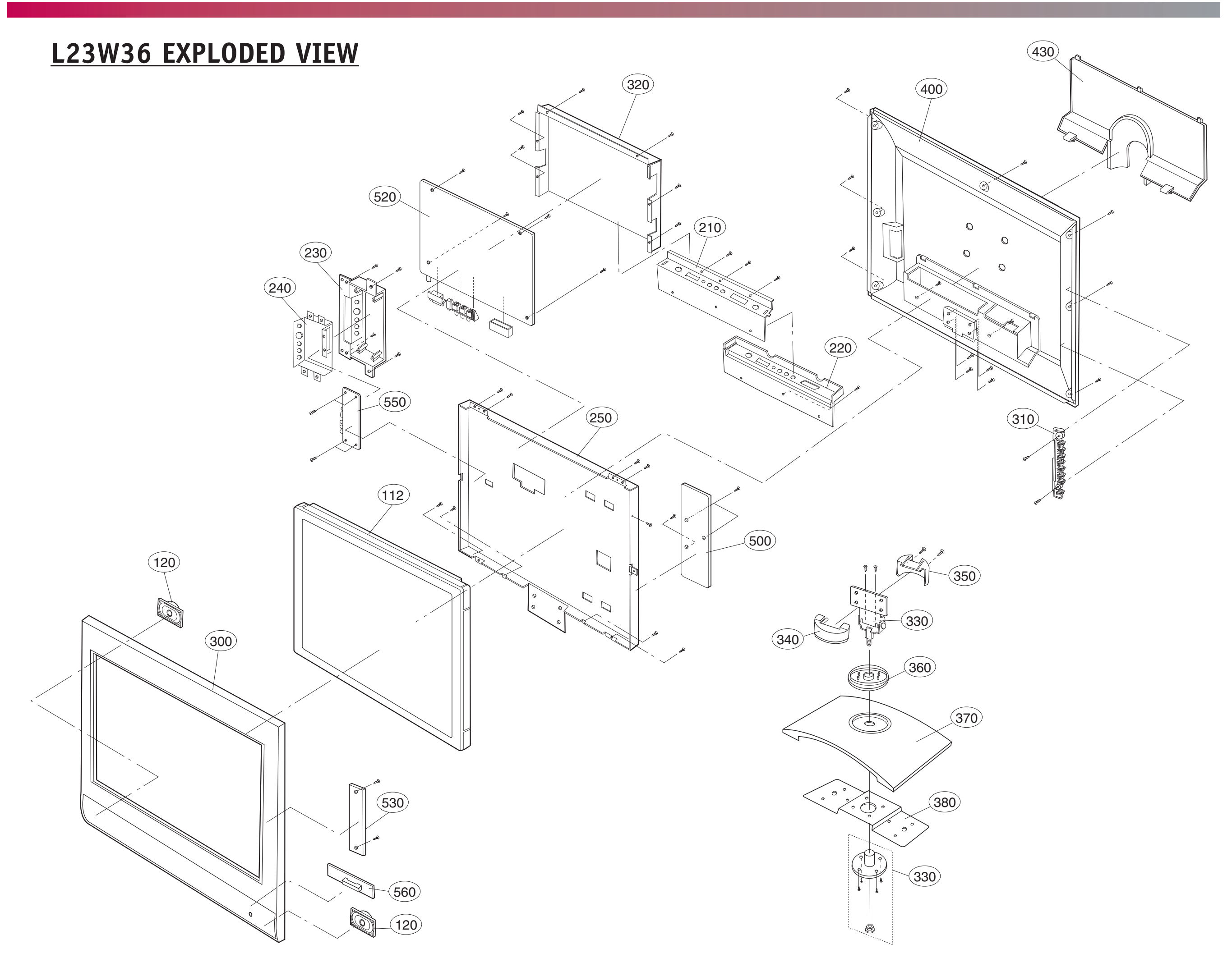
# DISASSEMBLY

## L20V36 EXPLODED VIEW



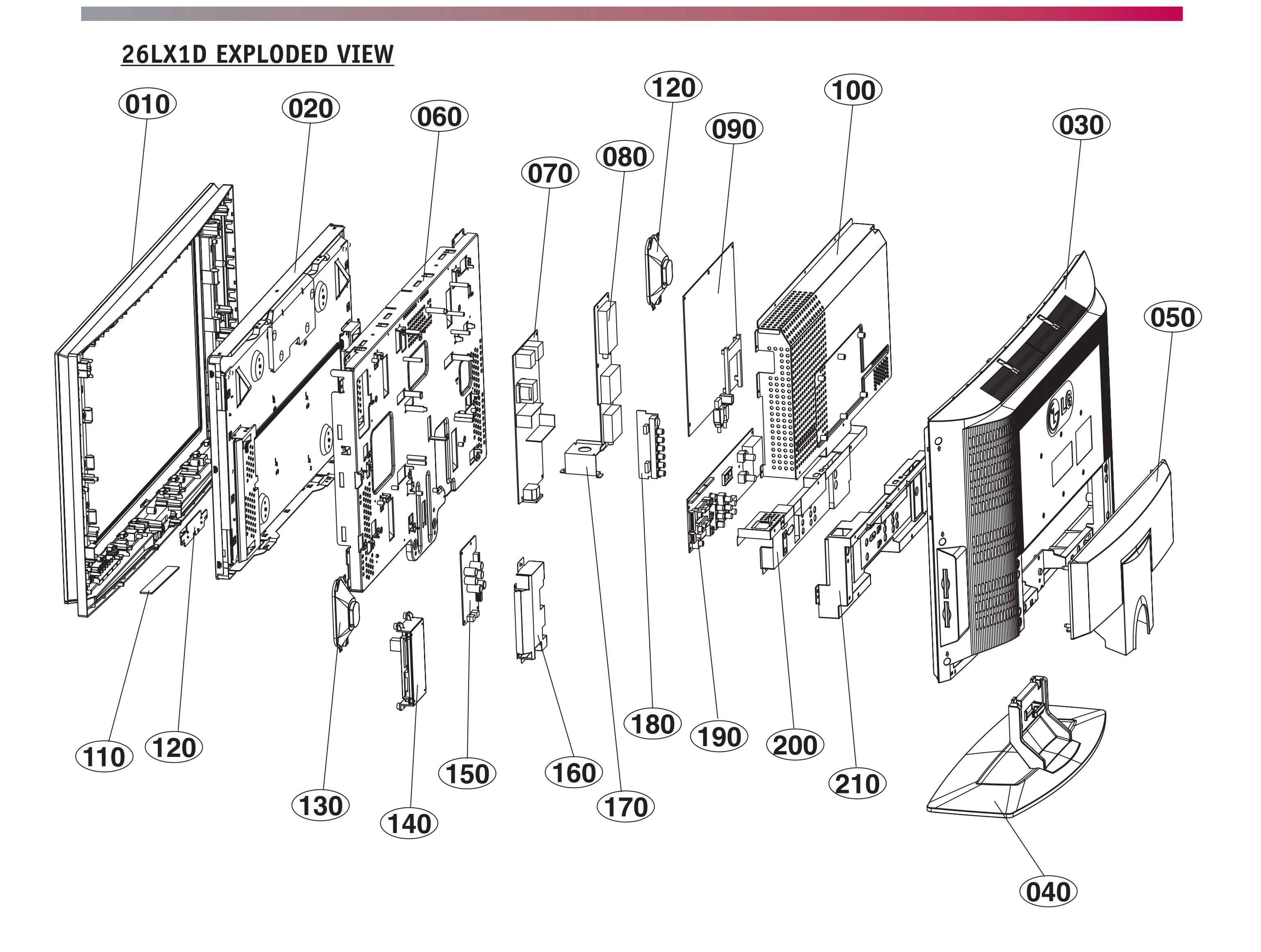

| L20V36 Model Parts | | |
|---|---|---|
| LOC | PART | DESCRIPTION |
| 112 | 6304VT2011B | LCD MODULE,LC201V02-A3(IPS) LG PHILPS TFT 20.1 |
| 120 | 6400GKTX01A | SPEAKER,FULLRANGE F1527C-6428 K-TONE 8OHM 7/12W |
| 210 | 4950V00141A | METAL,SHIELD NON REAR AV, 20LA60 |
| 220 | 4810V00764D | BRACKET,REAR AV ML012B HIPS 40AF |
| 230 | 4810V00765C | BRACKET,SIDE AV ML012B HIPS 40AF |
| 240 | 4950V00142A | METAL,SHIELD NON SIDE AV, 20LA60/15LA60 |
| 250 | 4950V00132A | METAL,MAIN FRAME NON 20LA60 |
| 300 | 3091V00491C | CABINET ASSEMBLY,RU-20LA60 STEREO ML012B |
| 310 | 5020V00776B | BUTTON,CONTROL RU-20LA60 ABS, HF-380 8KEY |
| 320 | 4950V00140B | METAL,SHIELD SBHG 20LA60 |
| 330 | 4950V00157C | METAL,HINGE ASSY SPCC(CR) 20LA60 |
| 340 | 4810V00767B | BRACKET,STAND HINGE FRONT ABS, HF-380 |
| 350 | 4810V00768B | BRACKET,STAND HINGE COVER ABS, HF-380 |
| 360 | 4810V00766B | BRACKET,DECO STAND ABS, HF-380 |
| 370 | 4810V00769B | BRACKET,STAND ABS, HF-380 BASE |
| 380 | 4950V00133A | METAL,STAND NON BASE 20LA60 |
| 400 | 3809V00339C | BACK COVER ASSEMBLY,RU-20LA60 NON |
| 430 | 3550V00297B | COVER,REAR AV RU-20LA60 ABS, HF-380 |
| 520 | 6871VMMQ09A | PCB ASSEMBLY,MAIN ML012B RU-20LA60 |
| 530 | 6871VSMV38A | PCB ASSEMBLY,SUB CONT CONTROL ASSY |
| 540 | 6633VA0003Q | INVERTER,15V NON K.S. LC201V02-A3 IPS FRONTEK |
| 550 | 6871VSMV40C | PCB ASSEMBLY,SUB A/V SIDE A/V ASSY |
| 560 | 6871VSMV43A | PCB ASSEMBLY,SUB ML012B 20 INDEX LED ASSY |

## L23W36 EXPLODED VIEW



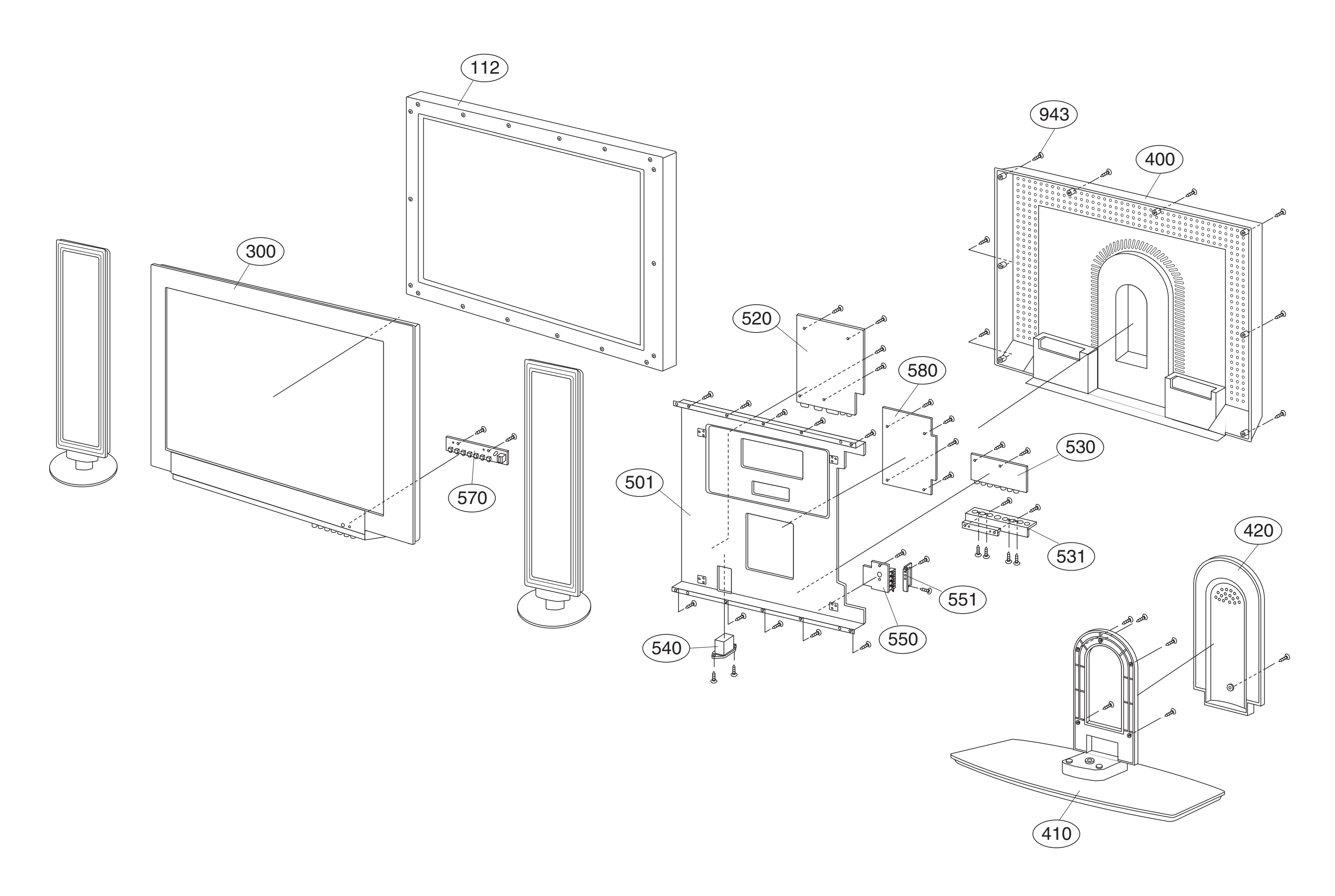

| L23W36 Model Parts | | |
|---|---|---|
| LOC | PART | DESCRIPTION |
| 112 | 6306V23001A | LCD MODULE,LC230W01-A2 LG PHILPS TFT COLOR 23 WXGA LCD |
| 120 | 6400GKTX01A | SPEAKER,FULLRANGE F1527C-6428 (GENERAL) 8OHM 7/12W 83DB |
| 210 | 4950V00151B | METAL,SHIELD ET |
| 230 | 4810V00765E | BRACKET,SIDE AV RU-23LZ20 ML027C HIPS 40AF |
| 240 | 4950V00142A | METAL,SHIELD NON SIDE AV, 20LA60/15LA60 |
| 250 | 4950V00149C | METAL,FRAME SECC(EGI) |
| 300 | 3091V00518B | CABINET ASSEMBLY,RU-23LZ20 STEREO ML027C |
| 310 | 5020V00781A | BUTTON,CONTROL RZ-23LZ20 ABS 8KEY |
| 320 | 4950V00150A | METAL,SHIELD SBHG RZ-23LZ20 |
| 330 | 4950V00157D | METAL,HINGE ASSY SPCC(CR) RZ-23LZ20 |
| 340 | 4810V00767A | BRACKET,STAND 20LA60 ML012B NON HINGE FRONT |
| 350 | 4810V00768A | BRACKET,STAND 20LA60 ML012B NON HINGE COVER |
| 360 | 4810V00766A | BRACKET,DECO 20LA60 ML012B NON STAND DECO. |
| 370 | 4810V00769E | BRACKET,STAND RU-23LZ20 NON ABS, HF-380 . |
| 380 | 4950V00133A | METAL,STAND NON BASE 20LA60 |
| 400 | 3809V00359B | BACK COVER ASSEMBLY,RU-23LZ20 NON |
| 430 | 3500V00068A | BOARD,AV RZ-23LZ20 ML027A COVER REAR |
| 520 | 6871VMMQ43A | PCB ASSEMBLY,MAIN ML-027C RU-23LZ20 |
| 530 | 6871VSMW11A | PCB ASSEMBLY,SUB CONT ML027C MANNUAL ASSY |
| 540 | 6871VSMW07A | PCB ASSEMBLY,SUB POWER ML027C ASSY |
| 550 | 6871VSMV40E | PCB ASSEMBLY,SUB A/V ML027C RU-23LZ20 |
| 560 | 6871VSMW12B | PCB ASSEMBLY,SUB WINDO ML027C INDEX MANNUAL ASSY |

## 26LX1D EXPLODED VIEW



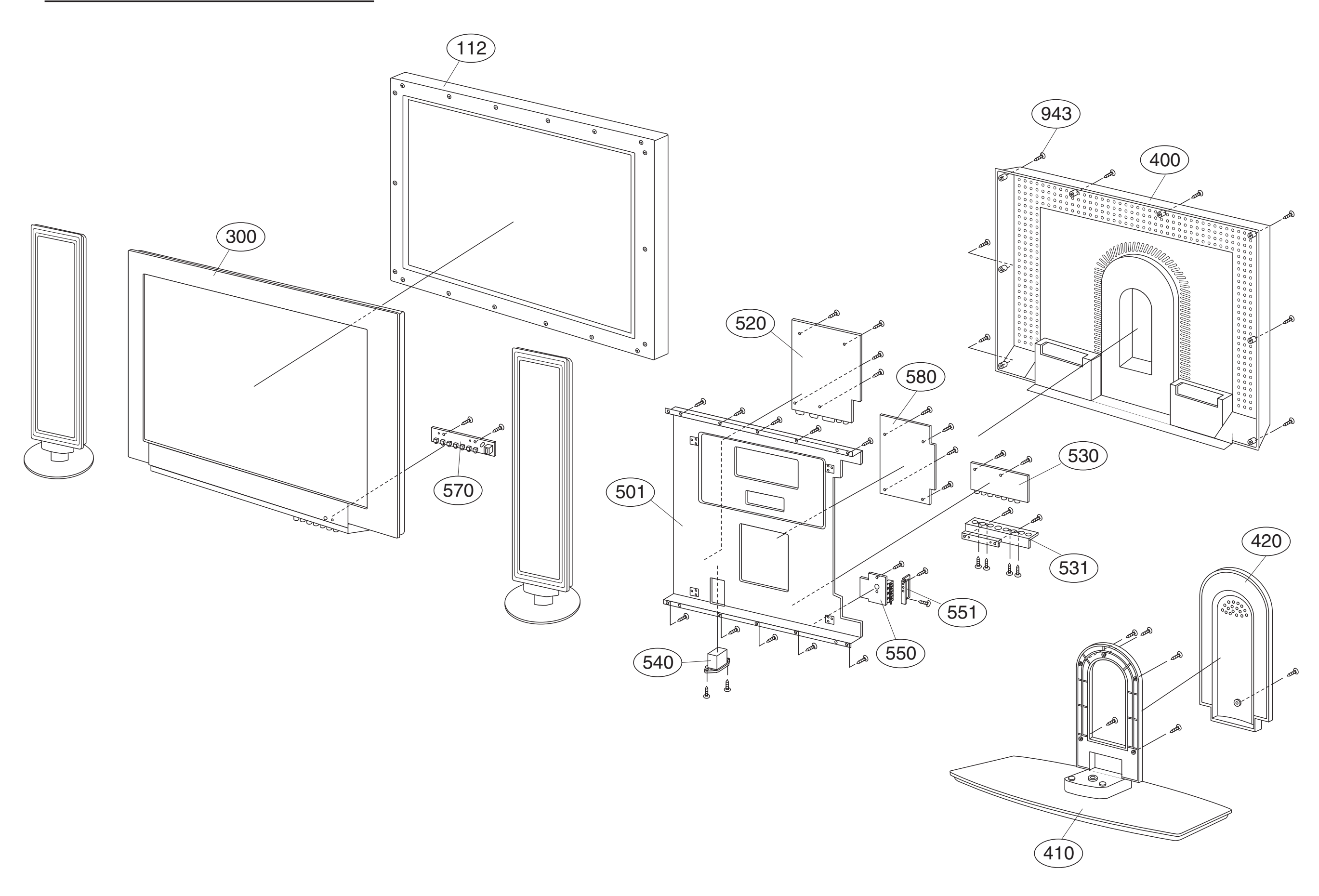

| 26LX1D Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 10 | 3091TKE032A | CABINET DU-26LG10 3090TKE024Y | 110 | 6871TSTA48A | CONTROL PCB 26/32LX1D-U KEY CONTROL SUB |
| | 3091TKE032B | CABINET, 26LX1D BRAND DU C/SKD | 120 | 6871TST937A | IR&LIGHT PCB 26LX1D-U |
| 20 | 6304FLP190A | LCD, LC260WX2-SL03 LG PHILPS IPS WIDE | 130 | 6400GESF01A | SPEAKER, C112A02K1450 ESTEC 8OHM 10/15W |
| 30 | 3809TKE029A | BACK COVER, DU-26LG10 3808TKE024 | 140 | 3141TZZ174A | CHASSIS ASSEMBLY, 26LX1D-UA EPF OARD |
| | 3809TKE029C | BACK COVER, 26LX1D ML-051A C/SKD | 150 | 6871TST940A | AUDIO PCB 26LX1D-U |
| 40 | 3043TKK171G | TILT SWIVEL, 26LX1D BK AL-04DA | 160 | 4810TKK302A | BRACKET, DU-26LG10 REAR BRACKET EPF |
| | 3043TKK171H | TILT SWIVEL, 26LX1D BK AL-04DA C/SKD | 170 | 4951TKK262A | SUPPORT FAN ASSEMLY 5900V05005A |
| 50 | 3550TKK816A | COVER, DU-26LG10 REAR AV | | 4951TKK262B | SUPPORT FAN ASSEMLY 5900V05005B |
| 60 | 4951TKS211A | MAIN FRAME ASSEMBLY DU-26LG10 | 180 | 6871TST938A | SIDE A/V ASSEMBLY, 26LX1D-U |
| | 4951TKS211C | MAIN FRAME ASSEMBLY 26LX1D C/SKD | 190 | 3313TD2001A | ANALOG ASSEMBLY, 26LX1D-U AL-04DA |
| 70 | 6871TPT303B | POWER PCB, DU(DCR) COMM-SH(D112) | 200 | 4950TKA191A | METAL, REAR SHIELD, DU-26LG10 |
| 80 | 6871TST939A | TUNER PCB 26LX1D-U | | 4950TKA191B | METAL, REAR SHIELD, DU-26LX1D C/SKD |
| 90 | 3313TD2002A | DIGITAL/MAIN ASSEMBLY AL-04DA | 210 | 3551TKK572A | COVER ASSEMBLY, DU-26LG10 REAR . AV ASSY |
| 100 | 4951TKK258A | SHIELD ASSEMBLY, 26LX1D | | | |
| | 4951TKK258D | SHIELD ASSEMBLY, 26LX1D-UA C/SKD | | | |

## L30W26 EXPLODED VIEW



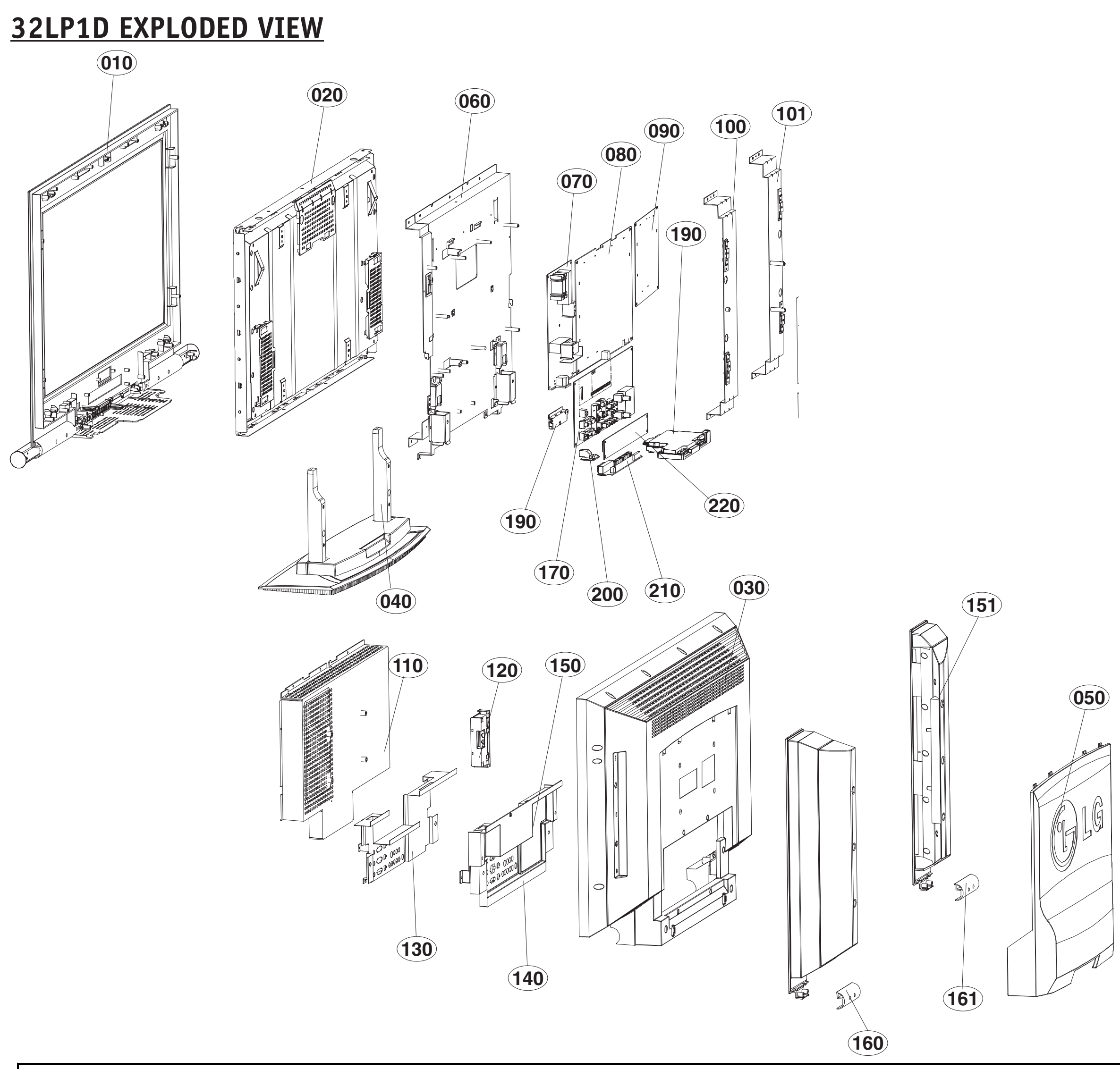

| L30W26 Model Parts | | |
|---|---|---|
| LOC | PART | DESCRIPTION |
| 112 | 6305V00001A | LCD ASSEMBLY,30" LCD PANEL LC30W01-A3 AND I |
| 300 | 3091V00A73B | CABINET ASSEMBLY |
| 400 | 3809V00A33B | BACK COVER ASSEMBLY |
| 410 | 3501V00083A | BOARD ASSEMBLY,BASE MW-30LZ10 |
| 420 | 3508V00306A | DECO,REAR COVER |
| 501 | 4980V00505B | SUPPORTER ASSY,MODULE |
| 520 | 6871VMN648A | PCB ASSEMBLY,MAIN MF-02HA MW-30LZ10 MAIN BO |
| 530 | 6871VSN182B | PCB ASSEMBLY,SUB A/V MF-02HA MW-30LZ10 AV BOARD |
| 531 | 4930V00226E | HOLDER,AV |
| 540 | 3141VPN048A | CHASSIS ASSEMBLY,SMPS MF-02HA LCD30 SWITCH |
| 550 | 6871VSN181A | PCB ASSEMBLY,SUB SPK MF-02HA MW-30LZ10 SPK BOAR |
| 551 | 4930V00224C | HOLDER,SPK JACK |
| 560 | 6633VA0004A | INVERTER ASSEMBLY,24VOLT 1100VOLT K.S. KLS300W1 |
| 570 | 6871VSN180A | PCB ASSEMBLY,SUB CONT MF-02HA MW-30LZ10 CONTROL |
| 580 | 3501V00091A | BOARD ASSEMBLY,SMPS PFC MW-30LZ10 MF-02HA LCD |
| 943 | 1FBF0403122 | SCREW,D4.0 L16.0 |

## L30W36 EXPLODED VIEW



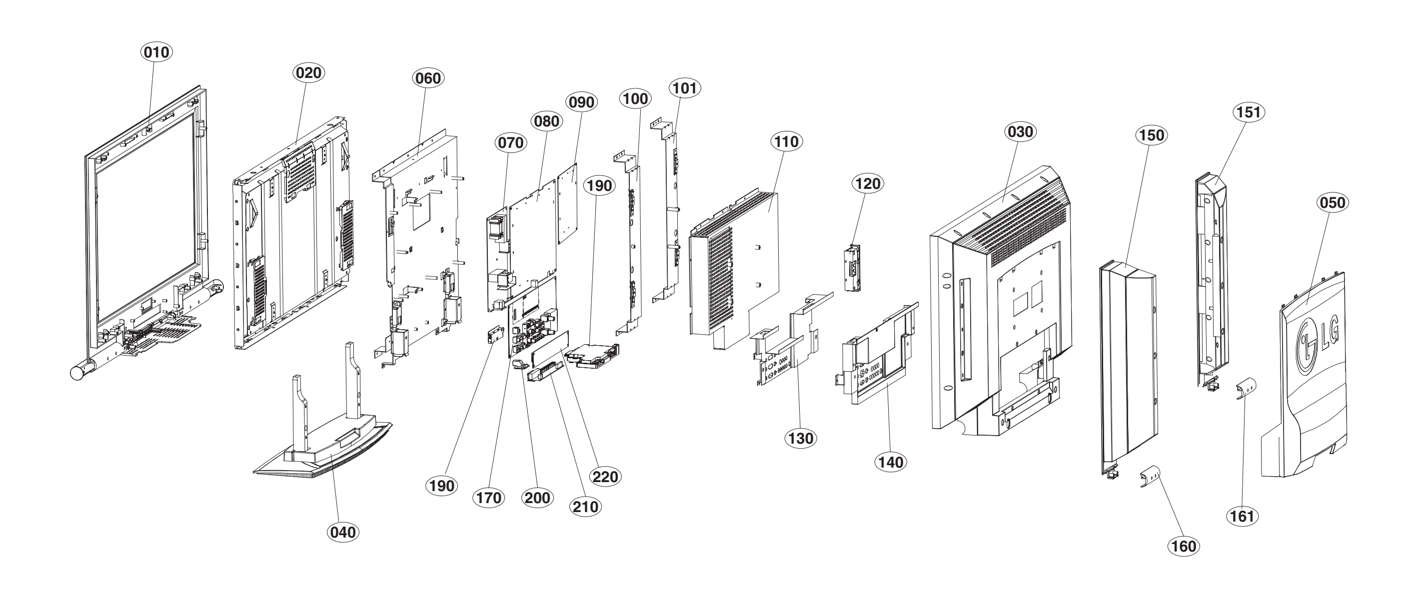

| L23W36 Model Parts | | |
|---|---|---|
| LOC | PART | DESCRIPTION |
| 112 | 6305V00001A | LCD ASSEMBLY,30" LCD PANEL LC30W01-A3 AND I |
| 300 | 3091V00A73E | CABINET ASSEMBLY |
| 400 | 3809V00A33B | BACK COVER ASSEMBLY |
| | 3809V00A33D | BACK COVER ASSEMBLY |
| 410 | 3501V00083A | BOARD ASSEMBLY,BASE MW-30LZ10 |
| 420 | 3508V00306A | DECO,REAR COVER |
| 501 | 4980V00505B | SUPPORTER ASSY,MODULE |
| 520 | 6871VMN648A | PCB ASSEMBLY,MAIN MF-02HA MW-30LZ10 MAIN |
| | 6871VMN637A | PCB ASSEMBLY,MAIN MF-02HA MW-30LZ10 MAIN |
| 530 | 6871VSN182B | PCB ASSEMBLY,SUB A/V MF-02HA MW-30LZ10 AV |
| 531 | 4930V00226E | HOLDER,AV |
| 540 | 3141VPN048A | CHASSIS ASSEMBLY,SMPS MF-02HA LCD30 SWITCH |
| 550 | 6871VSN181A | PCB ASSEMBLY,SUB SPK MF-02HA MW-30LZ10 SPK |
| 551 | 4930V00224C | HOLDER,SPK JACK |
| 560 | 6633VA0004A | INVERTER ASSEMBLY,24VOLT 1100VOLT K.S. KLS300W1 |
| 570 | 6871VSN180A | PCB ASSEMBLY,SUB CONT MF-02HA MW-30LZ10 CONTROL |
| 580 | 3501V00091A | BOARD ASSEMBLY,SMPS PFC MW-30LZ10 MF-02HA LCD |
| 943 | 1FBF0403122 | SCREW,D4.0 L16.0 |

## 32LP1D EXPLODED VIEW



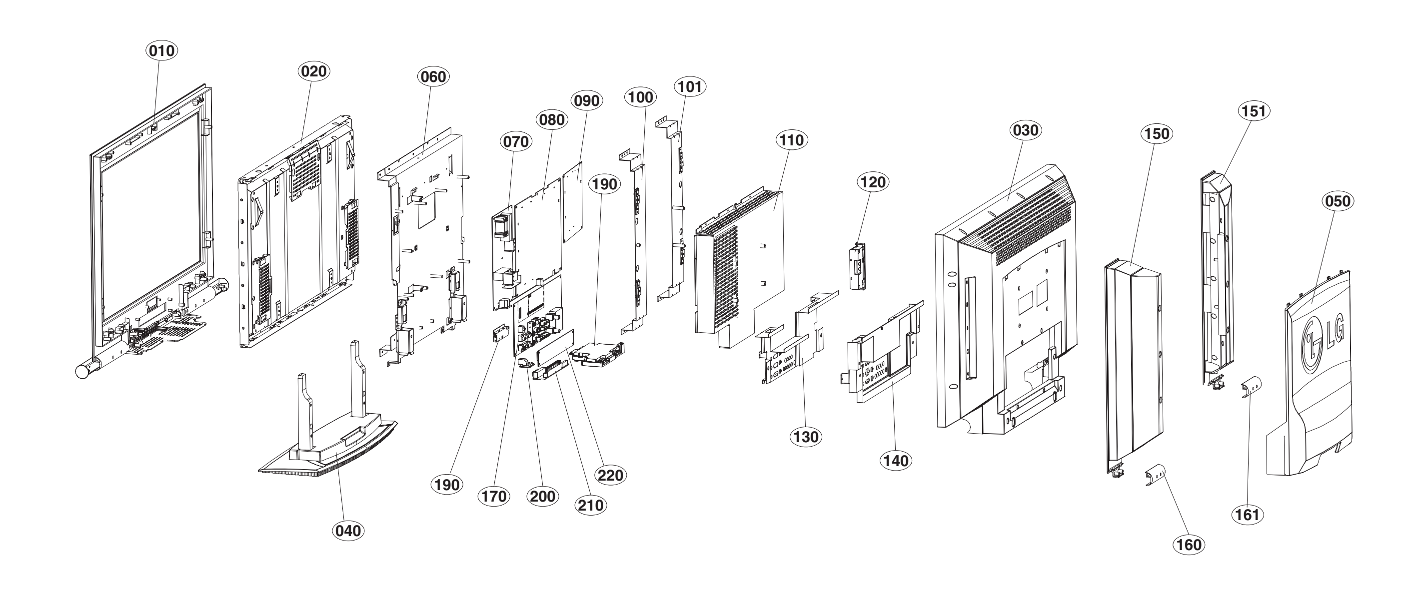

| 32LP1D Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 10 | 3091TKE023B | CABINET, 32LP10 3090TKE019 BLACK, DU | 110 | 4951TKK238G | METAL ASSEMBLY, FRAME REAR 32LP1D |
| | 3091TKE023G | CABINET, 3090TKE019 BLACK, FOR CKD | | 4951TKK238H | METAL ASSEMBLY, FRAME REAR 32LP1D, CKD |
| 20 | 6304FLP290A | LCD, LC320W01-A6K6 LG PHILPS AIODC | 120 | 6871TSTB40A | SIDE AV SUB PCB, 32LP1D-UA ETC . |
| | or 6304FLP181A | LCD, LC320W01-A6K3 LG PHILPSLAI ODC | 130 | 4951TKK263B | METAL ASSEMBLY, REAR SHIELD |
| 30 | 3809TKE022D | BACK COVER,3808TKE020 WHITH HOLDER | 140 | 3551TKK561B | REAR AV COVER, 32LP10-DU BRACKET |
| | 3809TKE022E | BACK COVER,3808TKE020 WHITH HOLDER | | 3551TKK561G | REAR AV COVER, 32LP1D-UA BRACKET, CKD |
| 40 | 3043TKK214B | TILT SWIVEL ASSEMBLY, 32LP10 . FOR DU | 150 | 3551TKS058B | SPEAKER COVER, 32LP10 BLACK |
| | 3043TKK214E | TILT SWIVEL ASSEMBLY, 32LP1D-UA CKD | 151 | 3551TKS058B | SPEAKER COVER, 32LP10 BLACK |
| 50 | 3550TKK714A | COVER, 32LP10 REAR A/V | 160 | 4950TKA058A | METAL, PLATE AL DECO REAR SPEAKER L |
| | 3550TKK714B | COVER, 32LP10 REAR A/V FOR CKD | 161 | 4950TKA058A | METAL, PLATE AL DECO REAR SPEAKER L |
| 60 | 4951TKS193B | METAL ASSEMBLY, FRAME 32LP10-DU | 170 | 6871TST754A | SUB PCB, DU-32LP10 ETC TUNER |
| | 4951TKS193F | METAL ASSEMBLY, FRAME 32LP1D-UA CKD | 180 | 3141TZZ173A | CHASSIS ASSEMBLY, 32LP1D-U EPF BOARD |
| 70 | 6871TPT303B | POWER PCB, DU/DN/DI-32LP10 (DCR) | 190 | 6871TSTA93A | SUB PCB, 32LP1D-UA LOGO ETC TOTAL |
| 80 | 3313TD3049A | MAIN, 32LP1D-UA DIGITAL AL-04DA | 200 | 6871TSTA73A | IR SUB PCB, 32LP1D-U TOTAL |
| 90 | 3313TD3047A | MAIN, 32LP1D-UA ANALOG AL-04DA | 210 | 6871TSTB39A | FRONT CONTROL SUB PCB |
| 100 | 4951TKK228B | METAL ASSEMBLY, FRAME SIDE R(32LP10) | 220 | 6871TSTA24A | VFD LED & P/SW SUB PCB |
| 101 | 4951TKK228B | METAL ASSEMBLY, FRAME SIDE R(32LP10) | | | |

## 37LP1D EXPLODED VIEW




| 42LP1D Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 10 | 3091TKE028C | CABINET ASSEMBLY, 37LP1D-UA BRAND | 101 | 4951TKK262C | FAN SUPPORT 5900V05005A (37LP10 ONLY) |
| | 3091TKE028F | CABINET ASSEMBLY, 37LP1D-UA (C/SKD) | 110 | 4951TKS240A | REAR SHIELD ASSY |
| 20 | 6304FLP291A | LCD, LC370W01-C6K1 LG PHILIPS ODC | | 4951TKS240B | REAR SHIELD ASSY(C/SKD) |
| | or 6304FLP178A | LCD, LC370W01-C6 LG PHILPS P6 PLANT, ODC | 120 | 6871TSTA23A | SIDE A/V PCB, 37LP1D-UA ETC |
| 30 | 3809TKE026A | BACK COVER, 37LP10 | 130 | 4950TKA120B | AV REAR SHIELD 37LP1D-UA/37LP1D-NA |
| | 3809TKE026D | BACK COVER, 37LP1D-UA(C/SKD) | 140 | 3551TKK586B | REAR AV BRACKET COVER 37LP1D-U |
| 40 | 3043TKK224B | TILT SWIVEL STAND 37LP1D-UA (SET) | 150 | 3551TKS063B | SPEAKER COVER 37LP1D-UA BLACK |
| | 3043TKK224D | TILT SWIVEL STAND 37LP1D-UA (C/SKD) | 151 | 3551TKS063B | SPEAKER COVER 37LP1D-UA BLACK |
| 50 | 3550TKK768A | COVER, 37LP10 REAR | 160 | 4950TKA131A | METAL SUPPORT AL DECO SPK REAR LEFT |
| | 3550TKK768B | COVER, 37LP10 REAR C/SKD | 161 | 4950TKA132A | METAL SUPPORTAL DECO SPK REAR RIGHT |
| 60 | 4951TKS213B | METAL FRAME, 37LP1D-UA, 37LP1D-NA | 170 | 6871TSTA25A | TUNER PCB, 37LP1D-UA ETC |
| | 4951TKS213D | METAL FRAME, 37LP1D-UA(C/SKD) | 180 | 3141TZZ177A | CHASSIS ASSEMBLY, 37LP1D-U EPF ASSY |
| 70 | 6871TPT315A | POWER PCB 37-42 DCR KNPOWERTEK | 190 | 6871TSTB31A | LOGO PCB ASSEMBLY, 37LP1D-UA |
| 80 | 3313TD3050A | DIGITAL PCB, 37LP1D-UA AL-04DA | 200 | 6871TSTA73A | IR PCB,SUB, 32LP1D-U |
| 90 | 3313TD3048A | ANALOG PCB, 37LP1D-UA AL-04DA | 210 | 6871TSTB41A | FRONT CONTROL PCB 37LP1D-UA. |
| 100 | 4951TKK262C | FAN SUPPORT 5900V05005A(37LP10 ONLY) | 220 | 6871TSTA24A | LED & P/SW PCB, 37LP1D-UA VFD |

## 42LP1D EXPLODED VIEW




| 42LP1D Model Parts | | | | | |
|---|---|---|---|---|---|
| ITEM | PART | DESCRIPTION | ITEM | PART | DESCRIPTION |
| 10 | 3091TKE031B | CABINET 42LP10 3090TKE023A (UA) | 101 | 4951TKK262A | SUPPORT FAN ASSY 5900V05005A |
| | 3091TKE031F | CABINET 42LP10 3090TKE023A (UA-SKD) | 110 | 4951TKK276K | SHIELD AV ASSY, 42LP1D-UA |
| 20 | 6304FLP286A | LCD LC420W02-B4K4 LG PHILPS B4K3 REV | 120 | 6871TSTA27A | SIDE A/V PCB 42LP1D-UA ETC |
| | or 6304FLP216A | LCD LC420W02-B4K3 LG PHILPS LEAD FREE | 130 | 4950TKA120F | REAR AV METAL SHIELD 42LP1D-UA,NA |
| | 6304FLP295A | LCD LC420W02-B6K1 LG PHILPS B6+STATUS PIN | 140 | 3551TKK597B | REAR A/V COVER 42LP1D (UA) |
| 30 | 3809TKE028B | BACK COVER, 3808TKE023 (NO SERVICE LABEL) | 150 | 3551TKS061B | SPEAKER COVER, 42LP1D LEFT(UA,BLACK) |
| | 3809TKE028C | BACK COVER, 3808TKE023 (SKD-NO SERVICE LABEL) | 151 | 3551TKS062B | SPEAKER COVER, 42LP1D RIGHT(UA,BLACK) |
| 40 | 3043TKK238B | TILT SWIVEL STAND (UA) | 160 | 4950TKA189A | METAL, FIX AL DECO REAR PIECE |
| | 3043TKK238D | TILT SWIVEL STAND (UA) SKD | 161 | 4950TKA189A | METAL, FIX AL DECO REAR PIECE |
| 50 | 3550TKK812A | COVER, 42LP10 REAR (DECO) | 170 | 6871TSTA29A | TUNER PCB, 42LP1D-UA TUNER ETC |
| | 3550TKK812B | COVER, 42LP10 REAR (DECO-SKD) | 180 | 3141TZZ178A | CHASSIS ASSEMBLY, 42LP1D-U EPF ASSY |
| 60 | 4951TKS210B | FRAME ASSEMBLY (42LP10,UA) | 190 | 6871TSTB32A | LOGO PCB, 42LP1D-UA LOGO |
| 70 | 6871TPT315A | POWER PCB, 37-42 DCR KNPOWERTEK | 200 | 6871TSTA73A | IR PCB,SUB, 32LP1D-U IR SUB |
| 80 | 3313TD4015A | DIGITAL PCB, 42LP1D-UA AL-04DA | 210 | 6871TSTB42A | FRONT CONTROL PCB,SUB, 42LP1D-UA |
| 90 | 3313TD4014A | ANALOG PCB, 42LP1D-UA AL-04DA | 220 | 6871TSTA24A | LED & P/SW PCB, 37LP1D-UA VFD |
| 100 | 4951TKK262A | SUPPORT FAN ASSY 5900V05005A | | | |

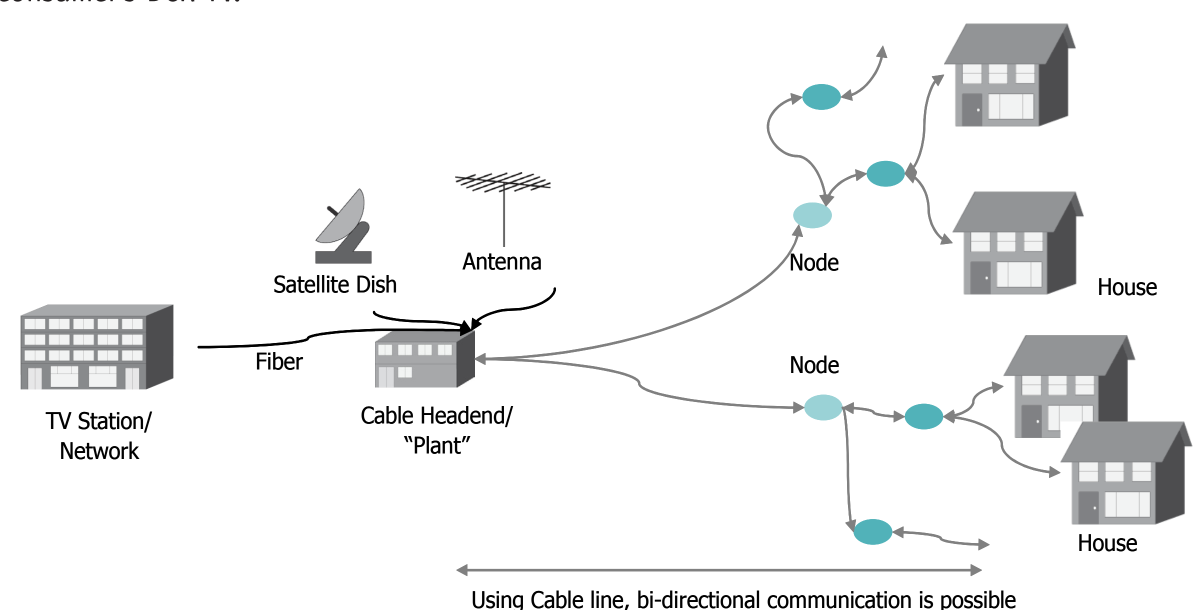
# CABLECARD

## DIGITAL CABLE READY (DCR)

A "plug-and-play" DTV is a television that you can plug directly into your cable system and receive analog and most digital cable services without the need for a set-top box. The cable and consumer electronics industries have dubbed these types of televisions "digital cable ready" or "DCR."

Digital plug-and-play will not work quite like analog. For digital plug-and-play, you'll probably need to get a security card (also known as a CableCARD™) from your local cable operator. The security card will permit you to watch scrambled programming and premium services, to which you're subscribed.

A CableCARD device is A PCMCIA card distributed by cable operators and inserted into a DCR TV(Host) to enable premium services, also called "Card" and "Point of Deployment(POD) module". It provides authorization, CA (Conditional Access) decryption and CP (Copy Protection) encryption functions for the consumer's DCR TV.




## CEA-NCTA AGREEMENT

- Signed Dec 19, 2002
- An agreement between cable operators and the consumer electronics industry
- How to offer digital programming over cable lines to current and future digital televisions without the need for a set-top box
- "Unidirectional" cable-ready digital television sets (called UDCP or UDRD)
  * Conditional access mechanism
  * Separate CableCARD (POD) card
  * Only receive information from the headend (one-way)
- Cable industry: Comcast, Cox, Time Warner, etc. (8 companies)
- CE industry: Philips, Panasonic, Zenith, Samsung, Sony, etc (14 companies)
- First Verification started Feb 2004 (VW18) based on PICS/ATP

- DCR TV can receive:
  * Off-air HD/HD through cable
  * Off-air/Cable Analog & Digital
- But, DCR TV doesn't support:
  * VOD, Impulse PPV
  * EPG service provided by MSO

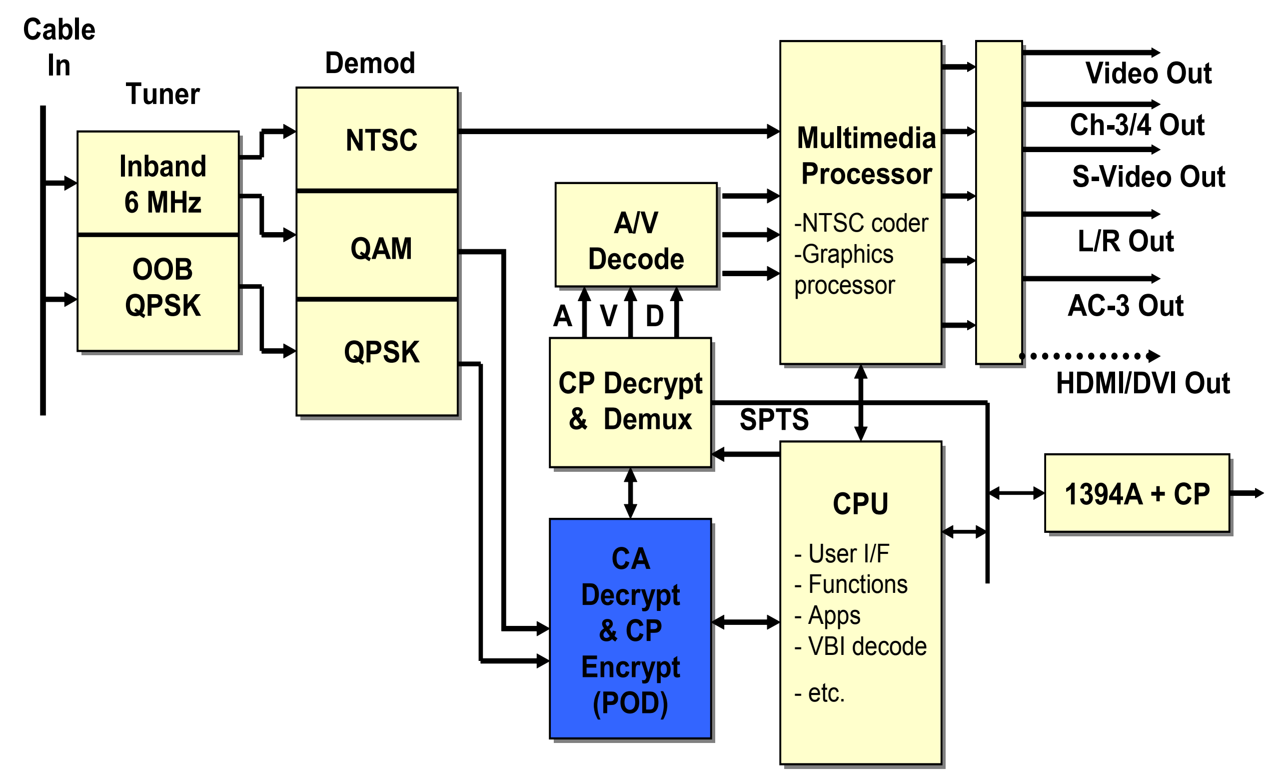
## TERMS

CEA: Consumer Electronics Association
NCTA: National Cable & Telecommunications Association
POD: Point-Of-Deployment
UDCP: Uni-Directional Cable Product, UDRD : Uni-Directional Receiving Device
DCR: Digital Cable Ready
PICS: Protocol Implementation Conformance Statements
ATP: Acceptance Test Plan
PPV: Pay Per View
Off-air: Terrestrial retransmission through cable
Inband tuner: FAT tuner
OOB tuner: FDC tuner
CA: Conditional Access
CP: Copy Protection
OOB: Out Of Band
RDC: Reverse Data Channel
OOB: Out of Band
FDC: Forward Data Channel
FAT: Forward Application Transport
PSI: Program Service Information
SI: Service Information
Clear channel: Any channel that is not scrambled or encripted. Thus the customer will be able to recieve these channels with only basic cable service.
Scrambled/Encripted Channels: Channels that are scrambled or encripted and require additional equipment to recieve these channels. EX: Cablecard or cable box.

## VENDORS

- CableCARD (POD) vendors:
  Motorola, Scientific Atlanta, SCM/NDS
- Cable HeadEnd vendors:
  Motorola, Scientific Atlanta, Harmonic
- Cable MSO (Multiple System Operators)
  Comcast, Time Warner, Charter, Cox, Adelphia, Bright House, Mediacom, Insight, CSC Holdings, Cable One, Advance/Newhouse, etc.

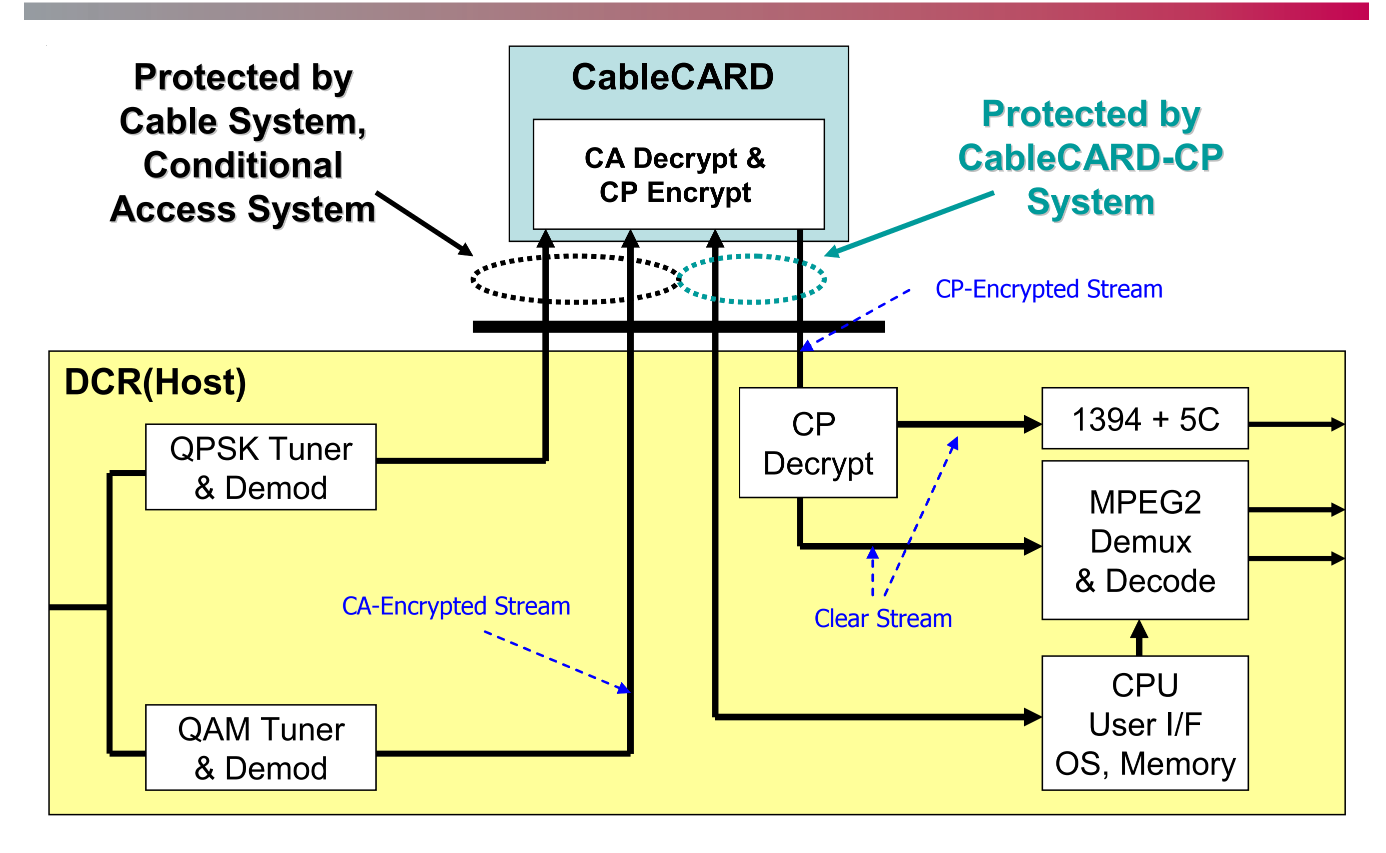
## DCR ARCHITECTURE




The OOB (Out Of Band) tuner runs all the time, locked to the frequency which it is given by the Cablecard. The data from the Headend should be on this frequency. If it is not, the tuner wil not see the data nor will the Cablecard. EX: If the cablecard tells the unit to tune to 104.20Mhz. The unit will tune to 104.20Mhz and not search for other frequencies. If the MSO (Multi System Operator) has the cards prgrammed to give the unit a list of frequencies, the unit will search that list of frequencies to find the data and then lock. If the data is on 104.25Mhz, neither the unit nor card can get the data needed to receive a channel list and an authorization list , the CP and decrypt data. As a result, the unit will not be allowed to tune premium channels.

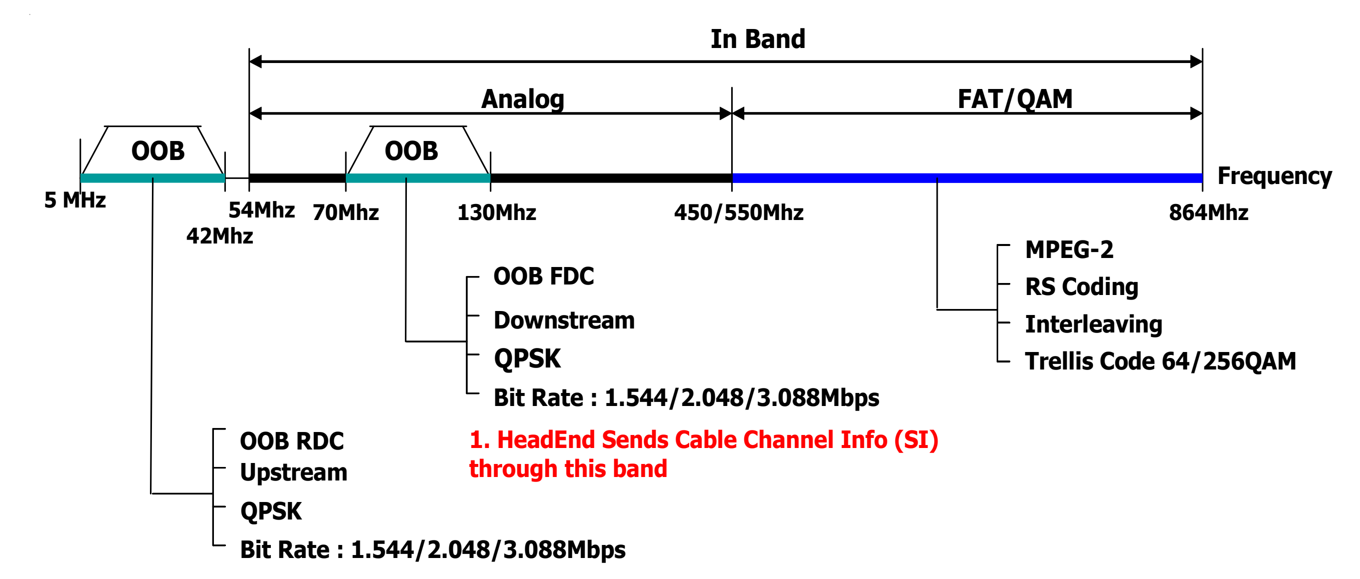
## HOST-CABLECARD INTERFACE

The data communication to and from the Cablecard  and unit is encrypted. The Host (Unit) and POD (Cablecard) share a buffer so that the data from the headend is never lost.  Some of the buffer is in the POD and some is in the host.The authorization list, CP data, Decrypt data and some other data is updated every 10 -20 seconds. This allows the cable company to add, remove, and rearrange channels as needed and the Cablecard is updated within seconds without the customer having to run EZ Scan to load new channels added to their lineup. The data from the headend is at regular intervals and can fluctuate in timing. This causes the data to flow at a higher rate at times and a lower rate at other times depending on other tasks the headend is performing on the system. The comunication between the POD and host is a two way relationship. While the communication between the Cablecard and headed is only one way, from the headend to the card.




Most but not all, CADTV (Cable Digital Television) channels are scrambled and or encrypted. Therefore decryption is a part of a premium package the customer pays for. There are a few channels the cable company has to provide as open channels. This allows the customer who purchases an HD ready TV that is capable of processing QAM to recieve a few HD channels thru the cable system. In LG units there are two ways the channels are displayed, as 2 part channels (EX: 107-1) and as single part channels EX: 107. With the Cablecard inserted the CADTV map will show only single part channels. Without the card installed the CADTV map will show two part channels. Due to this it will be in the ASC's best intrest to have a constantly updated channel lineup showing which are scrambled and which are open channels for all the headends in the area you service product. A good relationship with the local cable company is crucial to this so you are kept up to date with fast changing channel lineups. This can prevent you from trying to repair a product that is not defective. EX: The customer complains they no longer recieve CH 186 which was Discovery HD a scrambled channel. The real cause is the headend moved that channel to CH 205 and CH 186 is no longer in the channel map. All this occurs through the OOB channel.

## IN-BAND/OOB SPECIFICATION




## CABLECARD AUTHORIZATION & VALIDATION PROCESSES

- In order to activate CA service (called low-value service) and to receive Cable channel map, "Authorization process" is needed.
  * Serial number and CableCARD ID are needed.
  * During this process, CableCARD reset may occur.
  * After this process is finished successfully, user can navigate cable channel map & can watch CA Encrypted services to which the user subscribes.
- In order to activate additional CP services (called high-value service), a "Validation process" is needed.
  * Host/CableCARD ID is needed.
  * HeadEnd sends Validation message through OOB channel.
  * After Validation message is received by the CableCARD, the user can watch CP Encrypted services also.

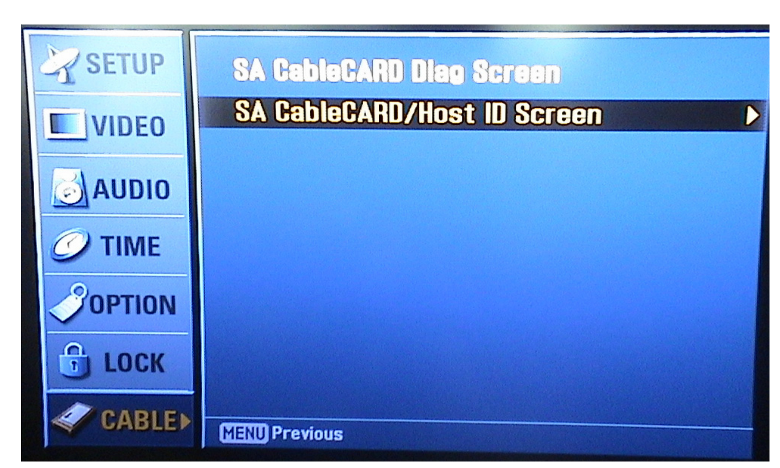
## DCR FUNCTIONALITIES

- Conditional Access Function
- Copy Protection Function
- Cable menu & MMI (Man Machine Interface) Function
- Digital Certificates
- CableCARD reset Function
- EAS (Emergency Alert System) Function
- Host Diagnostics Function
- CableCARD Firmware Upgrade Function
- Error Reporting Function

## CABLE MENU & MMI

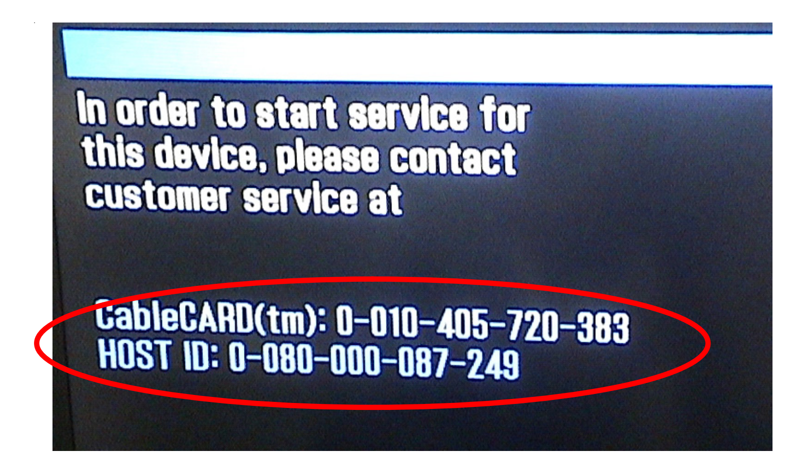
MMI = Man Machine Interface.

### SA CABLECARD




Using Cable Menu, user can check status of various CableCARD functions. The lists of this menu vary depending on the CableCARD manufacturer.

MMI Example: SA CableCARD case

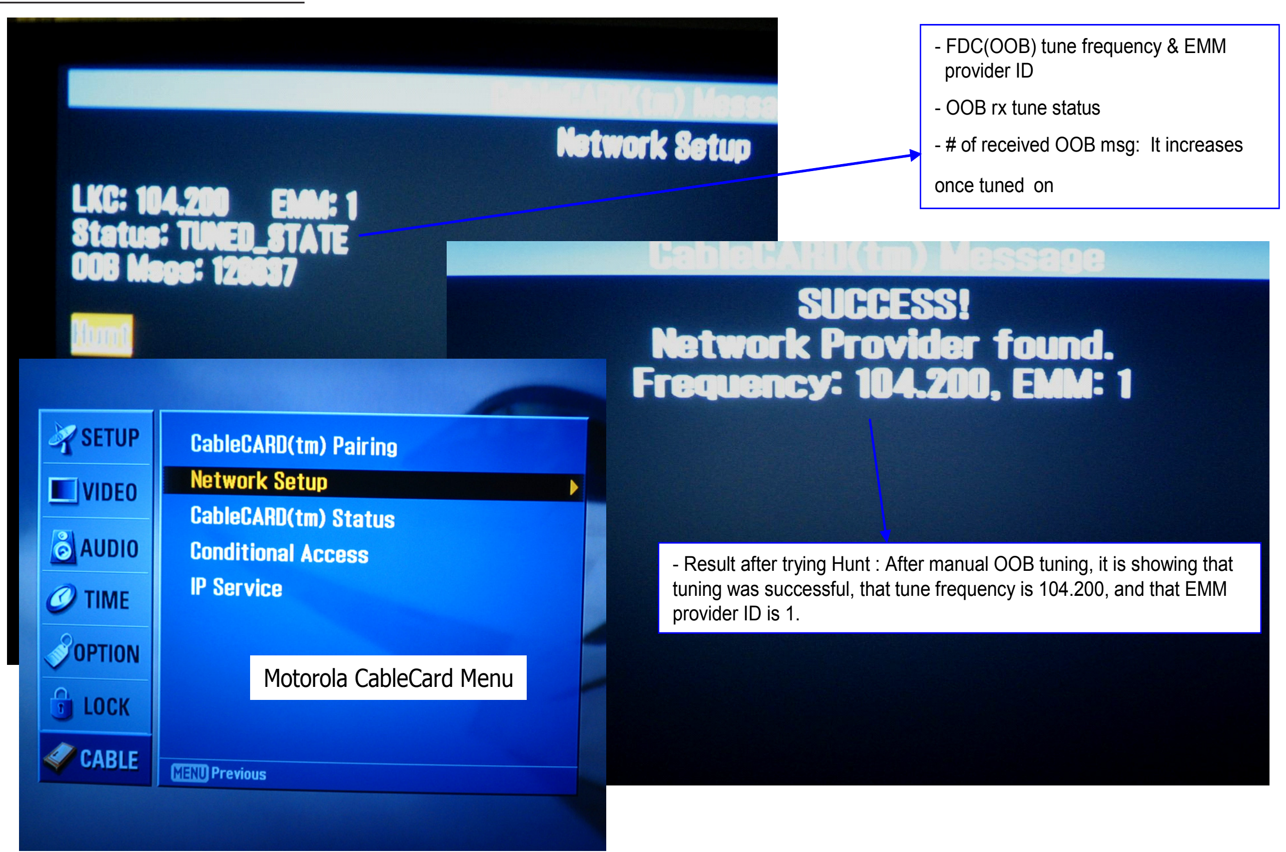


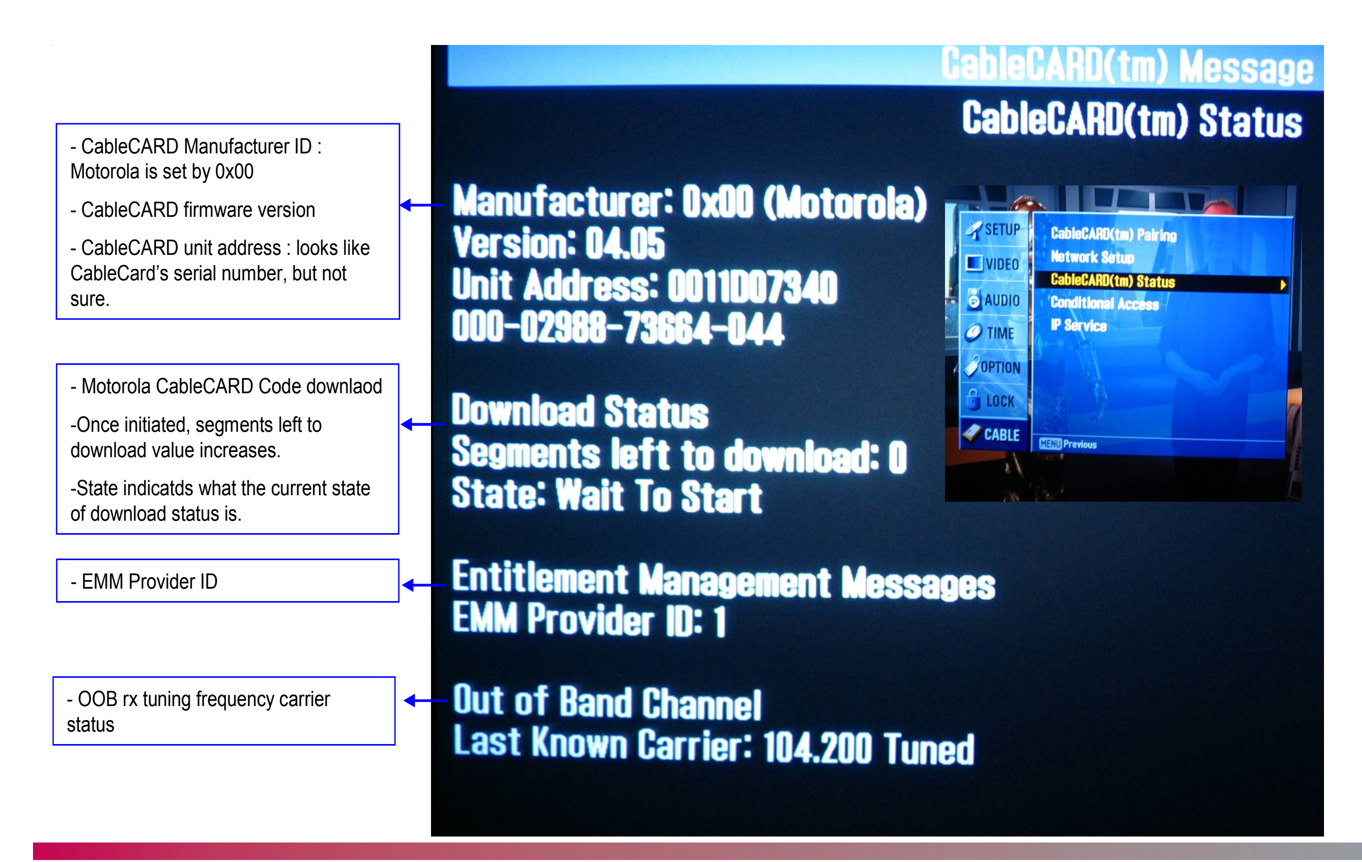

CableCARD uses MMI (Man Machine Interface) function to communicate with the user.

- CableCARD displays various user notification information through MMI window
- Host/CableCARD ID information

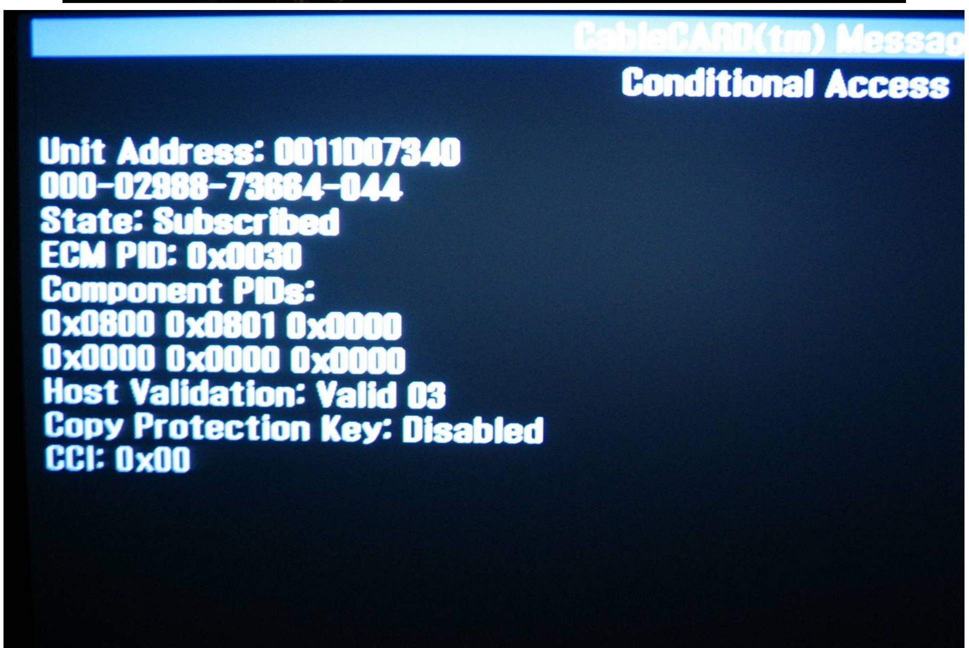
- the error reporting of Host's certification data.

## MOTOROLA CABLECARD






- CableCARD unit address: This is the unit address the cable company will use to address data to this specific unit.
- State: CA Authorization. If subscriber already in subscription for the channel, it shows Subscribed. That is, it could be changed for each channel tuned.
- ECM PID from current channel.
- Component PIDs: video PID and audio PID of the channel tuned.
- Host Validation: CP validation status. The number shows validation trial counting, which is not related with channel.
- CP key: If CCI is non-zero, it becomes "enabled." which means CP scrambler is functioning.
- CCI: CCI information from current channel. If CCI is zero, CP is not functioning.

The line item is channel specific. It is indicating that the channel presently tuned by the hosts tuner is a subscribed channel. This indicates that the Cablecard has received and authorization channel list. A copy Protection Key is presently disabled for this channel. This can change according to the actions taken by the headend.

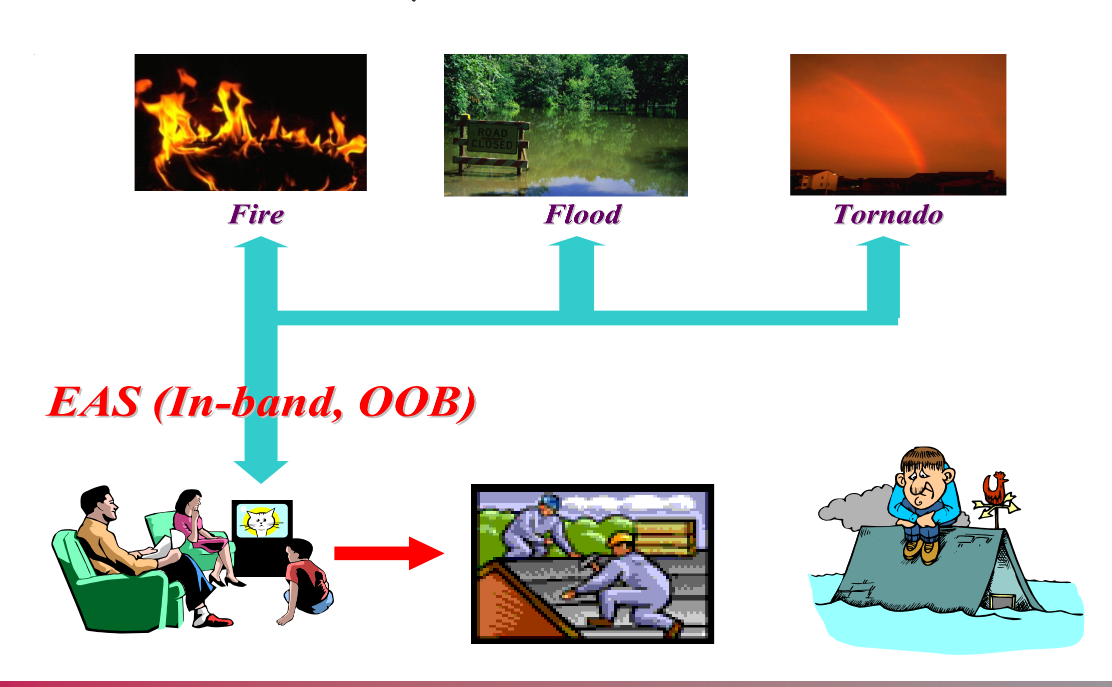
## DIGITAL CERTIFICATES DATA

- Every TV and CableCARD has Digital Certificates Data to identify itself.
  * Host/CableCARD ID is determined from the value of individual Digital Certificates Data.
  CableCARD side invalid Certificate
  "Please call your cable operator and report an invalid CableCARD" error message will be displayed.
- DTV side Invalid or Without Certificate
  "There was a technical problem during the authorization process. This production may have some component failure or may not be designed to be fully compatible with digital cable television service. Please contact the manufacturer or the retailer." MMI message will be displayed.

## CABLECARD RESET

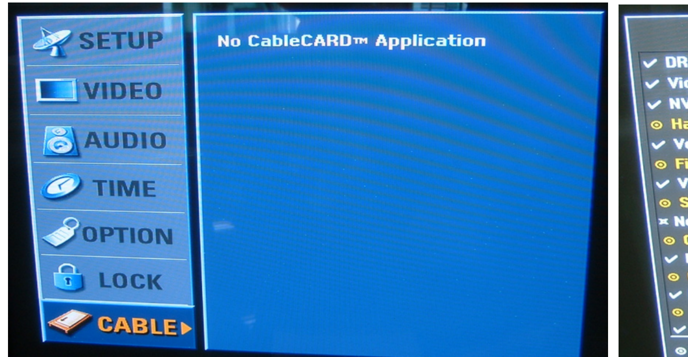
- Whenever the DCR TV or CableCARD think the other device is in an abnormal state, a CableCARD reset will recover the Host/CableCARD interface.
  * 161-xx technical problem case.
- There are normal states when the Host/CableCARD interface needs to reboot by way of a CableCARD reset.
  * CableCARD firmware upgrade case.
  * HeadEnd Authorization case.
- There are two types of CableCARD reset
  * PCMCIA reset (Cold reset, H/W level reset)
  * POD reset (Warm reset, S/W level reset)
- When the CableCARD reset occurs, and if the user is watching CA or CP Encrypted service at that time, video will freeze for about 20 seconds.

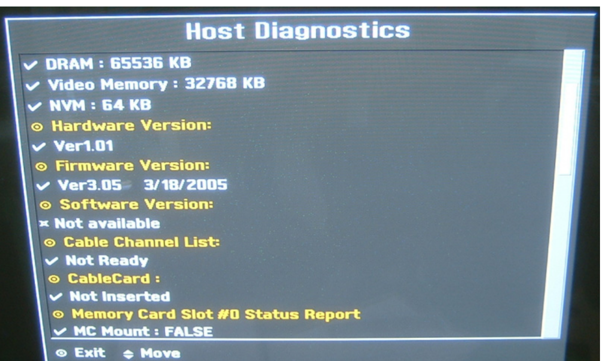
## EAS (EMERGENCY ALERT SYSTEM)



## HOST DIAGNOSTICS

- To check the state of various TV functions related to the CableCARD, uses Host Diagnostic menu.
  - press Menu->CABLE->"0"->"0"->"0" to get into Host Diagnostics menu.
  - Cable Channel List's status
  - FAT, FDC status
  - H/W & F/W version




CableCARD Firmware Upgrade From the Headend to the Cablecard.

- When the CableCARD Firmware Upgrade is needed, HeadEnd activates CableCARD Firmware Upgrade operation.
  * Delayed Upgrade mode (only at the stand-by state)
  * Immediate Upgrade mode (stand-by or power-on state)
- CableCARD Firmware Upgrade shouldn't be interrupted by other operations.
  * During this operation, a CableCARD Firmware Upgrade reporting message is being displayed and all remote control keys will be disabled temporarily.
  * Only SA uses CableCARD Firmware Upgrade protocol and SA uses in-band tuner for this operation.
  * Motorola uses their unique technique for the CableCARD firmware Upgrade and uses OOB tuner for this operation.

## ERROR REPORTING

- Per the standard (SCTE28 Appendix E), in the case of pre-defined errors, the DCR should display an error message showing the 161-xx technical problem and/or set CableCARD reset to recover from this error.
  * Failure mechanism is not the DCR but the CableCARD.
  * "xx" digits are the index of this error.

A technical problem is preventing you from receiving all cable services at this time.

Please call your cable operator and report error code 161-xx to have this problem resolved.

## CABLE CARD TROUBLESHOOTING

| No | Error Condition | Failure Mechanism |
|---|---|---|
| 1 | CableCARD READY signal does not go active. | CableCARD |
| 2 | LGE DTV reads incorrect CIS values | CableCARD |
| 3 | LGE DTV writes incorrect TPC11 E_INDX value to POD configuration register | LGE DTV |
| 4 | LGE DTV sets data channel RS bit but CableCARD fails to set FR bit within 5 second timeout. | CableCARD |
| 5 | Host sets extended channel RS bit but CableCARD fails to set FR bit within 5 second timeout. | CableCARD |
| 6 | Invalid buffer negotiation - CableCARD data channel (buffer size < 16) | CableCARD |
| 7 | Invalid buffer negotiation – LGE DTV data channel (buffer size < 16 or greater than CableCARD data channel buffer size) | LGE DTV |
| 8 | Invalid buffer negotiation – CableCARD extended channel (buffer size < 16) | CableCARD |
| 9 | Invalid buffer negotiation – LGE DTV extended channel (buffer size < 16 or greater than CableCARD data channel buffer size) | LGE DTV |
| 10 | CableCARD does not respond to Hosts open transport request within 5 seconds. | CableCARD |
| 11 | LGE DTV does not respond to CableCARD request to open resource manager session within 5 seconds. | LGE DTV |
| 12 | LGE DTV response to open resource manager session response – resource manager non-existent | LGE DTV |
| 13 | LGE DTV response to open resource manager session response – resource manager unavailable | LGE DTV |
| 14 | LGE DTV response to open resource manager session response – incorrect version of resource manager | LGE DTV |
| 15 | LGE DTV response to open resource manager session response – resource manager busy | LGE DTV |
| 16 | LGE DTV response to open resource manager session response – invalid status byte | LGE DTV |
| 17 | CableCARD fails to respond to profile_inq within 5 seconds. | CableCARD |
| 18 | LGE DTV resource response – no application information resource | LGE DTV |
| 19 | LGE DTV resource response - no LGE DTV control resource | LGE DTV |
| 20 | LGE DTV resource response - no system time resource | LGE DTV |
| 21 | LGE DTV resource response - no MMI resource | LGE DTV |
| 22 | LGE DTV resource response - no low speed communications | LGE DTV |
| 23 | LGE DTV resource response - no homing resource | LGE DTV |
| 24 | LGE DTV resource response - no copy protection resource | LGE DTV |

| No | Error Condition | Failure Mechanism |
|---|---|---|
| 25 | LGE DTV resource response - unknown resource identifier. | LGE DTV |
| 26 | LGE DTV fails to respond to open session request within 5 seconds. | LGE DTV |
| 27 | LGE DTV response to open application info resource session - application info non-existent | LGE DTV |
| 28 | LGE DTV response to open application info resource session - application info unavailable | LGE DTV |
| 29 | LGE DTV response to open application info resource session - incorrect version of application info | LGE DTV |
| 30 | LGE DTV response to open application info resource session - application info busy | LGE DTV |
| 31 | LGE DTV response to open application info resource session - invalid status byte | LGE DTV |
| 32 | CableCARD module requests to open conditional access session to the Host times out after 5 seconds. | LGE DTV |
| 33 | CableCARD response to conditional access resource session - conditional access non-existent | LGE DTV |
| 34 | CableCARD response to conditional access resource session - conditional access unavailable | LGE DTV |
| 35 | CableCARD response to conditional access resource session - incorrect version of conditional access | LGE DTV |
| 36 | CableCARD response to conditional access resource session - conditional access busy | LGE DTV |
| 37 | CableCARD response to conditional access resource session - invalid status byte | LGE DTV |
| 38 | CableCARD fails to respond to ca_info_inq within 5 seconds. | CableCARD |
| 39 | CableCARD module requests to open copy protection resource session to the LGE DTV times out after 5 seconds. | LG DTV |
| 40 | LGE DTV response to open copy protection resource session - copy protection non-existent | LG DTV |
| 41 | LGE DTV response to open copy protection resource session - copy protection unavailable | LG DTV |
| 42 | LGE DTV response to open copy protection resource session - copy protection busy | LG DTV |
| 43 | LGE DTV response to open copy protection resource session - invalid status byte | LG DTV |
| 44 | LGE DTV does not support POD's copy protection system. | LGE DTV/CableCARD incompatibility |
| 45 | LGE DTV and CableCARD do not mate | LGE DTV/CableCARD incompatibility |
| 46 | LGE DTV response to CP_sync – LGE DTV busy | LGE DTV |
| 47 | LGE DTV response to CP_sync - no CP support | LGE DTV |
| 48 | LGE DTV response to CP_sync - invalid status | LGE DTV |
| 49 | LGE DTV fails to respond to cp_open_req. | LGE DTV |
| 50 | Invalid LGE DTV certificate | LGE DTV |

| No | Error Condition | Failure Mechanism |
|---|---|---|
| 51 | Write Error (WE) occurs after completion of any transfer from LGE DTV to Cable CARD | **CableCARD or LGE DTV** |
| 52 | Read Error (RE) occurs after completion of any transfer from Cable CARD to LGE DTV | **CableCARD or LGE DTV** |
| 53 | CableCARD fails to respond to any request within 5 seconds. | **CableCARD** |
| 54 | Invalid session APDU from LGE DTV | **LGE DTV** |
| 55 | Invalid session APDU from Cable CARD | **CableCARD** |
| 56 | Invalid SPDU tag from LGE DTV | **LGE DTV** |
| 57 | Invalid SPDU tag from CableCARD | **CableCARD** |
| 58 | Invalid APDU tag from LGE DTV | **LGE DTV** |
| 59 | Invalid APDU tag from Cable CARD | **CableCARD** |
| 60 | Transport ID from Host that has not been created and confirmed by POD | **LGE DTV** |
| 61 | Transport ID from Cable CARD that has not been created by LGE DTV. | **CableCARD** |
| 62 | Session ID from LGE DTV that has not been created and confirmed by Cable CARD | **LGE DTV** |
| 63 | Session ID from CableCARD that has not been created by LGE DTV. | **CableCARD** |

The following chart will help as a guide to troubleshoot Cablecard related problems.

| Operation | Good Result | Else Problem |
|---|---|---|
| Plug in CableCARD™ | | |
| | Screen displays CableCARD Inserted | 1) Re-insert card<br>2) Try another card<br>>Defective card slot |
| Check Pairing<br>Menu > Cable > CableCard Pairing | | |
| | CableCard™: must not be all zeros | If all zeros, card defective |
| | Host ID: must not be all zeros | If all zeros, card defective |
| Check Channel List Ready<br>Menu > "000" | | |
| | Cable Channel List: Ready | Wait for download<br>>No OOB data – goto diagnostic screen |
| Goto Diagnostic Screen<br>Menu > "000" | | |
| | OOB S/N > 10 dB | Bad signal |
| | OOB frequency = Between 70 and 130 MHz | |
| | FAT Status :<br>SNR > 21 dB (64 QAM)<br>SNR > 28 dB (256QAM)<br>Carrier: Locked | Channel not receivable |
| Check OOB Function<br>Menu > Cable > Network Setup | | |
| | LKC shows frequency | |
| | Status: tuned state | |
| | OOB Msg: # should increase each time this screen is accessed | No OOB data signal |
| Check OOB Function<br>Menu > "000" | | |
| | FDC Status:<br>FDC_SNR > 10 dB | Weak, distorted signal |
| | FDC Center Freq: 75.25 MHz or between 70 and 130 MHz | |
| | FDC Carrier: Locked | |

Cable Operation Confirmation
(1) Confirm that the Cable Card is inserted in the slot.
(2) Enter the EZ adjust menu by pressing the Adjust key on the Service Remote Control (S R/C).
(3) Go to number 2 Cable Check and press the Right key (%).
(4) Confirm items below.

| NAME | NORMAL | DEFECTIVE |
|---|---|---|
| Descrambler Check | OK | Not OK |
| CableCARD | CableCARD is removed | CableCARD is inserted |
| OOB Path | Locked - OK | Unlocked - Not OK |
| FDC_SNR | 20bd or more - OK | Under 20db - Not OK |
| Video Signal | Normal Screen | Black Screen |

| CableCheck | | |
|---|---|---|
| 1 Descrambler Check | OK | |
| 2 CableCARD | CableCARD is inserted | |
| 3 OOB Path | OK | (Lock) |
| 4 FDC_SNR | OK | (23 db) |

## IN-HOME TROUBLESHOOTING

1. It is recommended that installers bring along a couple of CableCARDs for troubleshooting, This will help eliminate the CableCARD as a possible problem during the installation.
2. Before installing the CableCARD, installers should check that the Digital Cable Ready (DCR), also referred to as a HOST, is functional without a CableCARD.
   a. Verify Host (TV) Operation: The installer can perform this by connecting the RF cable to the correct cable input of the DCR (there may be connections for a terrestrial antenna) and verifying good picture quality. The DCR will display all non~encrypted analog and digital content. (The DCR must not receive RF signal via an STB or accessory RF modulator.) This will eliminate basic TV circuitry as a possible problem.
   b. Check that the CableCARD is inserted properly. When inserting cable card push carefully but firmly until you feel the card click into place.
   c. Verify RF from Cable System Tap: The installer can also connect a cable set top box to confirm reception of encrypted digital services. This will help eliminate the RF signal as a possible problem,
3. If the first CableCARD installed does not result in a User Interface screen (also referred to as MMI screen) within 5 ~ 7 minutes, try unplugging the AC Power cord of the DCR and reconnecting it (to reset the DCR) then try to await coming out of the User Interface screen again. If this is still unsuccessful, try another CableCARD.

a. To eliminate the possibility of a damaged CableCARD or DCR device, the technician should look closely at the CableCARD device to ensure that none of the pinholes are blocked or clogged.

b. Check Host Interface. Using a flashlight, the technician should check the CableCARD slot on the DCR TV to ensure that there are no bent pins.

4. If the second CableCARD is successful, make sure the CSR or Dispatcher knows the new MAC ID and CableCARD ID to complete the installation. The original card should be marked accordingly and returned for repair.
5. Check the CableCARD menu options. If the second CableCARD fails to bring up the User Interface screen, the technician should refer to the diagnostic menus on the DCR for further troubleshooting. The technician can pull up the User Interface screen manually through the menu choices. The customer should provide the User Manual, so the technician can easily navigate through the DCR TV menu screens. The table on the next page describes how to navigate the CableCARD menu. The list of selectable CableCARD options will vary, depending on your cable service provider or CableCARD manufacturer. The table also shows how to access diagnostic screens for the DCR TV. Many of these screens are not described in the User Manual.
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| CableCARD Mfg | Diagnostic Type | 1st key | 2nd key | 3rd key |
|---|---|---|---|---|
| ALL | CableCARD main menu | MENU | Use cursor to select CABLE icon then press ENTER | N/A |
| Motorola | CableCARD pairing status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select CableCARD Pairing option, press ENTER |
| Motorola | Network status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select Network Setup option, press ENTER |
| Motorola | CableCARD status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select CableCARD Status option, press ENTER |
| Motorola | CA status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select Conditional Access option, press ENTER |
| NDS | CableCARD pairing status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select CableCARD Pairing option, press ENTER |
| NDS | Network status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select Network Setup option, press ENTER |
| NDS | CA status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select Conditional Access option, press ENTER |
| SA | CableCARD Diagnostics | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select SA CableCARD Diag option, press ENTER |
| SA | CableCARD pairing status | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select SA CableCARD HOST ID option, press ENTER |
| SA | CableCARD Copy protection information | MENU | Use cursor to select CABLE icon then press ENTER | Use cursor to select SA CableCARD CP Screen option, press ENTER |

8. If the installer is still having a problem, the installer should report the problem to the MSO headend dispatcher for troubleshooting. If the cable company dispatcher (headend personnel) has completely checked their channel set-up, confirmed the accounting/billing system to setup is correct, and has confimed normal channel map with one or more other DCR TVs at the MSO headend, then go on to the next step,
9. If the installer determines that the DCR device is the problem (unit failed either item 2a or 3b above) and can go no further in correcting the problem, and if the installer determines that the host-pod pairing screen cannot be displayed with multiple CableCARDs, he or she should follow the directions given by the CE manufacturer in informing the customer of their options, The customer should start by contacting the CE manufacturer directly for assistance and/or repair infomation. In many cases, if the HOST is under warranty, the repair will be done at the customer's home when possible.

9. If using an STB will allow the customer to receive services on the damaged DCR device, the installer can leave a box in the customer's home until the customer resolves the issue with the CE manufacturer.
10. If the technician is able to install the CableCARD device and access the User Interface screen (also rreferred to as MMI screen), and has relayed the information to the dispatcher, but is still not receiving encrypted programming, this programming may be protected through the use of copy protection directive. Ensure that the information passed to dispatch is correct. Relay again the Host ID, CableCARD ID and Data ID (Motorola only). Dispatch will send a hit to the CableCARD once the infomation is checked and verified. The CableCARD must be paired to the Host before copy protected programming can be displayed. Note that it may take several minutes from the time dispatch sends the authorization before it reaches the DCR device. The MMI screens should be checked to verify if the authorization has been received. For SA systems the host-pod pairing screen should say "Authorization Received." For Motorola the Conditional Access MMl State parameter should say "Subscribed". (These should be verified by POD Manufacturers or cable companies.)
11. To confirm the Headend Validation for displaying the encrypted channel, the technician should check the CableCARD menu. For SA systems, the CableCARD Copy Protection Infom1ation menu should say "Authorization Received". For Motorola systems, the Conditional Access menu should say "Valid xx (2 digit).
12. If encrypted programming is still not displayed, installer should check the status of followings.
    a. Cable Channel List: Ready
    b. CableCard: Inserted
    c. FDC status (OOB Status):Lock
    d. SNR(Signal to Noise Ratio): higher than 12 dB is normal range,

The table below describes how to check status in the LG DCR TV.

| CableCARD Mfg | Diagnostic Type | 1st key | 2nd key | 3rd key | 4th key | 5th Key |
|---|---|---|---|---|---|---|
| ALL - works with any CableCARD | Host Diagnostics (In Band Signal Status, OOB Signal Status, etc) | MENU | Use cursor to select CABLE icon | Press button 0 (zero) | Press button 0 (zero) | Press button 0 (zero) |

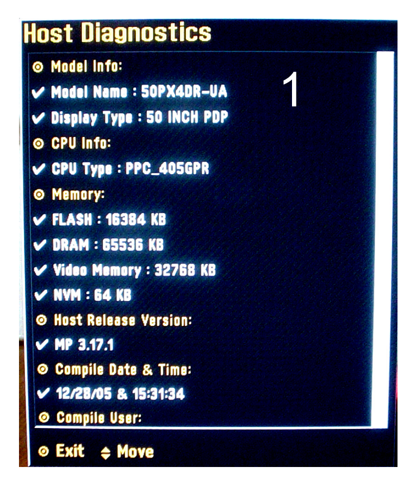
## CABLECARD TROUBLESHOOTING

### HOST DIAGNOSTICS

This Menu is only active on Cablecard ready units.

Accessing Host Diagnostics:

1. Press Menu on the customer's remote.
2. Press the up or down arrow key to highlight CABLE.
3. Press the 0 key three times. Scroll up and down this menu by using the up and down arrow keys.




The model info gives the factory model information also used to access the debug menu for software updates. Memory shows the available memory in the unit for video and audio processing and Cablecard functions. Host release is the present software revision in the unit.

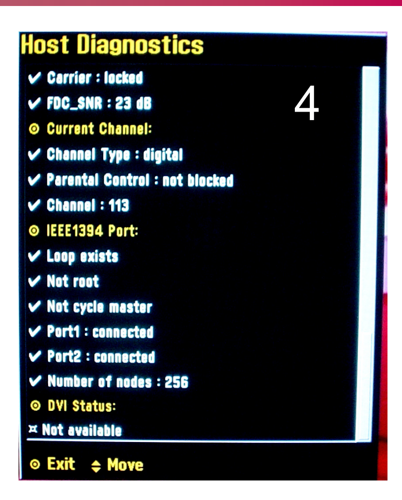


Gemstar Guide Version gives the original version of Gemstar in the unit when installed. Guide Update Version is the latest version of Gemstar loaded into the unit by Gemstar. Cable Channel List gives the status of the list of available channels in memory, with a Cablecard installed this should always display Ready. Cablecard indicates if the cablecard is inserted. If the Cablecard is inserted and the unit does not indicate that it is. There could be an issue with the Cablecard itself or with the programing in the card. Once this has been eliminated as the cause. The card slot or Digital PCB could be the cause.

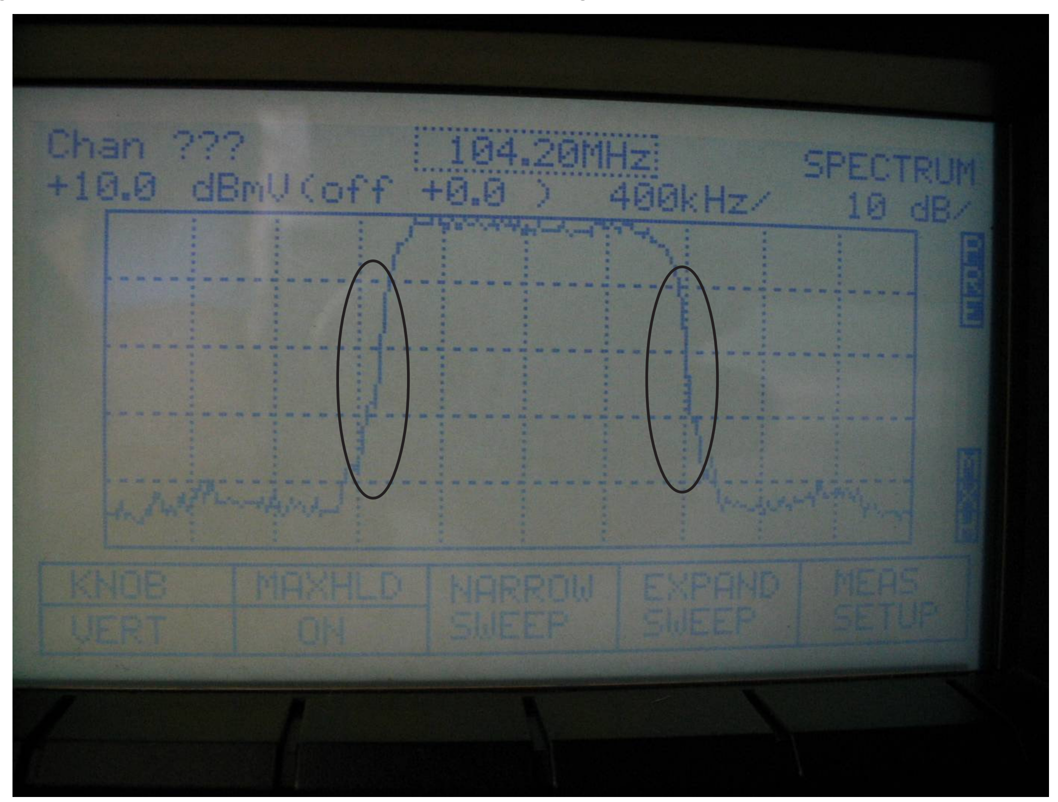


FAT Status tells the frequency of the presently tuned channel as well as the modulation QAM 256/64, digital, analog. Carrier locked indicates the carrier is locked on the center frequency. SNR gives the (Signal to Noise Ratio) of the present signal tuned. FDC is your (Forward Data Carrier) this gives the state of the OOB signal thru which the Cablecard receives data from the headend. It indicates the center frequency that the card told the unit to look at to find the signal. Carrier indicates the unit has the carrier locked or not locked. This must be locked for the Cablecard to operate. FDC_SNR gives the (Signal to Noise Ratio) for this OOB signal. Current Channel shows the channel type Digital or Analog as well as the Parental Control setting for this channel and the channel number.

This indicates the state of the IEE1394 and DVI ports and connection settings.

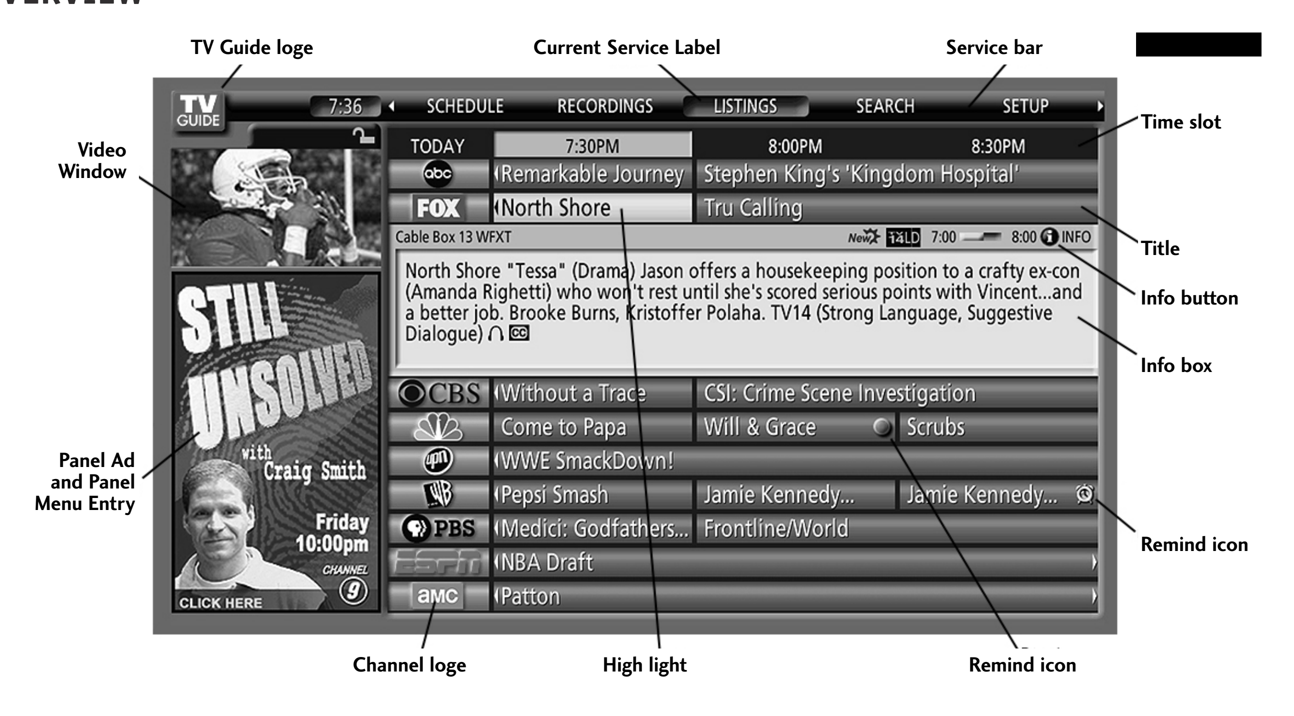



The meter below shows we are looking for 104.20Mhz. What we find is the signal is shifted slightly. This indicates the signal is not centered on 104.20Mhz. The OOB tuner is told to look for the data on 104.20Mhz but the data is actualy on 104.25Mhz. This is enough shift to prevent the card from receiving the data it needs from the headend. This signal is not allowed this much variation.



# TV GUIDE

## OVERVIEW




❶ Video Window - Displays TV video while The TV Guide On Screen system is displayed.

❷ Service Bar - Provides access to the 5 main Guide Services.

❸ Current Service Label - Indented to indicate current Service displayed.

❹ Tile - Displays show title.

❺ Highlight - Indicates an active tile.

❻ INFO Box - Provides information for a highlighted item.

❼ INFO Button - Indicates you can cycles through the various Info Box sizes.

❽ Channel Logo - Identifies network.

❾ Record/Remind Icons - Indicates a show is set to Record or set as a Reminder.

❿ Panel Ad - Location where show- or product-specific information appears (and also where Panel Menu appears).

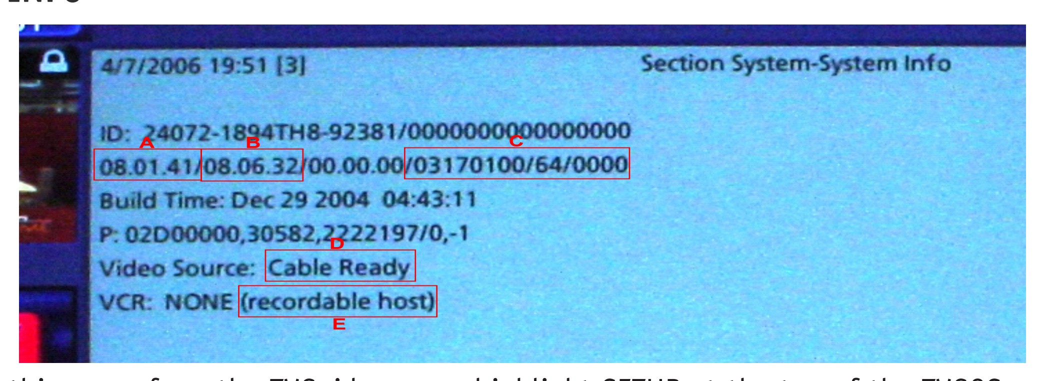
## OPERATION

TV Guide is a free service and is provided by Gemstar. TV Guide can be received OTA (Over The Air) thru an antenna. It can also be received thru cable service. OTA and thru the cable there must ba a strong signal on  the local ABC and PBS channels for TGOS to operate properly. An antena can be purchased to retrieve signals as far as 150 miles away and some even further. This is only a good idea for customers far away from any city. The reason is if the customer receives several ABC's and PBS broadcasts the unit will receive program data from more than one area, thus there will be a lot of incorrect program listings and errors.

If the customer has a unit with TVGOS and requires a cable box due to PPV (Pay Per View) or VOD (Video On Demand) and they desire to use TVGOS they will have to split the cable from the wall. One leg of the splitter will have to go to the cablebox and the other will have to go to the TV. Auto programming or EZ Scan will have to be run to load PBS and ABC channels into the unit. Any other connection can be used from the cablebox to the TV. If the TV cannot see ABC and PBS broadcasts with it's own tuners, TVGOS will not be downloaded to the unit. The cable box, if connected via coax cable, will only allow the TV to be tuned to channel 3 or 4.

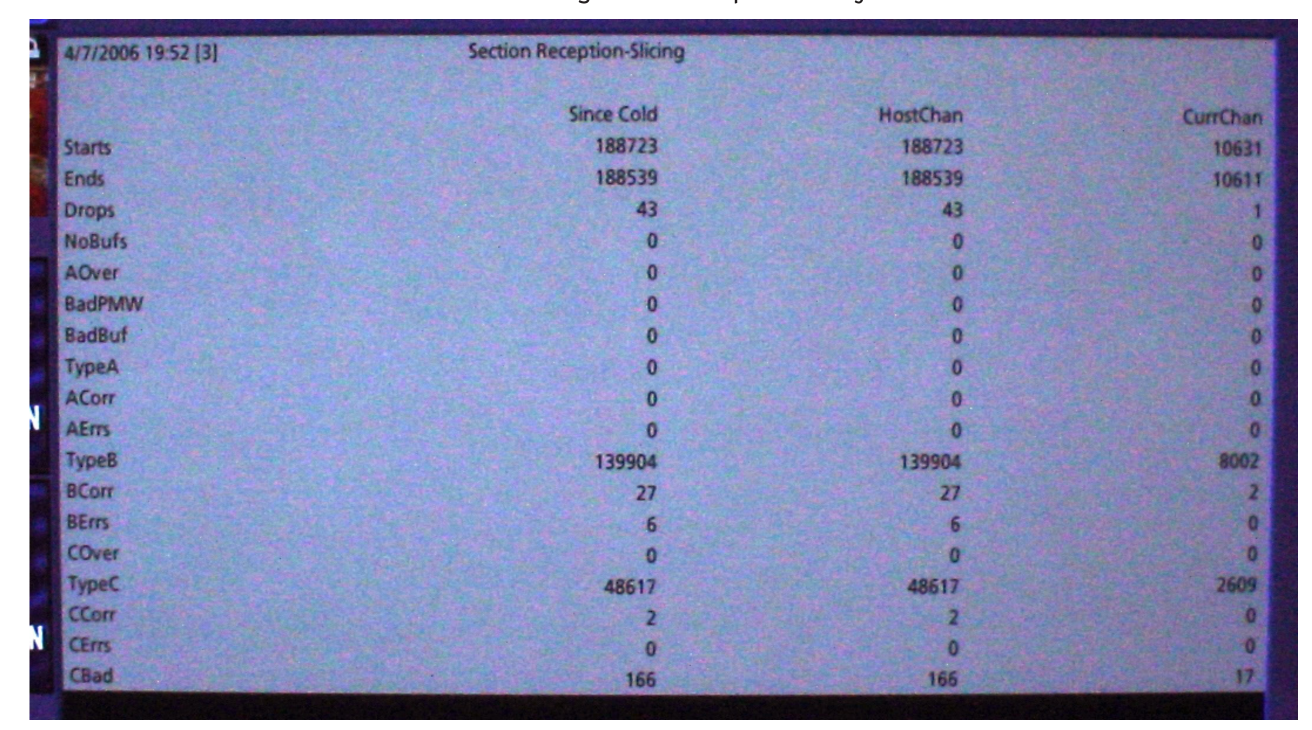
*NOTE: If the unit has been setup as if it has a cable box in TV Guide, the channel map and G-Link are also setup in TV Guide. The channel map will only see channels 3 or 4 and these are the only channels the unit will tune. If the cable box is removed, setup in TV Guide will have to be reconfigured without a cable box. This will allow the unit to tune channels other than just 3 or 4. Also, the channel map in the unit will show all channels it is authorized to see.*

## SYSTEM INFO




To access this menu from the TVGuide screen highlight SETUP at the top of the TVGOS screen press the down key once to highlight CHANGE SYSTEM SETTINGS and press 753159852. The screen above will appear. In Box (A) you can see the original version of Gemstar software the unit had when it was built. Box (B) you can see the version the unit has been updated to. To the right of box B, this will display the version when the unit receives an update again from Gemstar. Box (C) is the coding Gemstar uses for the programming area the unit has been programed for. Not all zip codes have the same or different cable provider and OTA (Over The Air) programming. As a result several zip codes can have the same code and programming. Box (D) tells what input the TV was programmed to look for the TVGOS signals and that the customer set it up as cable signal as the type of signal being supplied to the TV. If the only signal supplied is OTA, this would say ANTENNA. Box (E) saying

(recordable host) is letting you know the unit has the ability to record programs without the need or use of any other device. This unit has an HDD (Hard Disk Drive). If the unit was setup for a VCR to be used as the recording device then, this would display VCR. This will assist you in quickly determining if the customer has made an error in setting the unit up correctly.

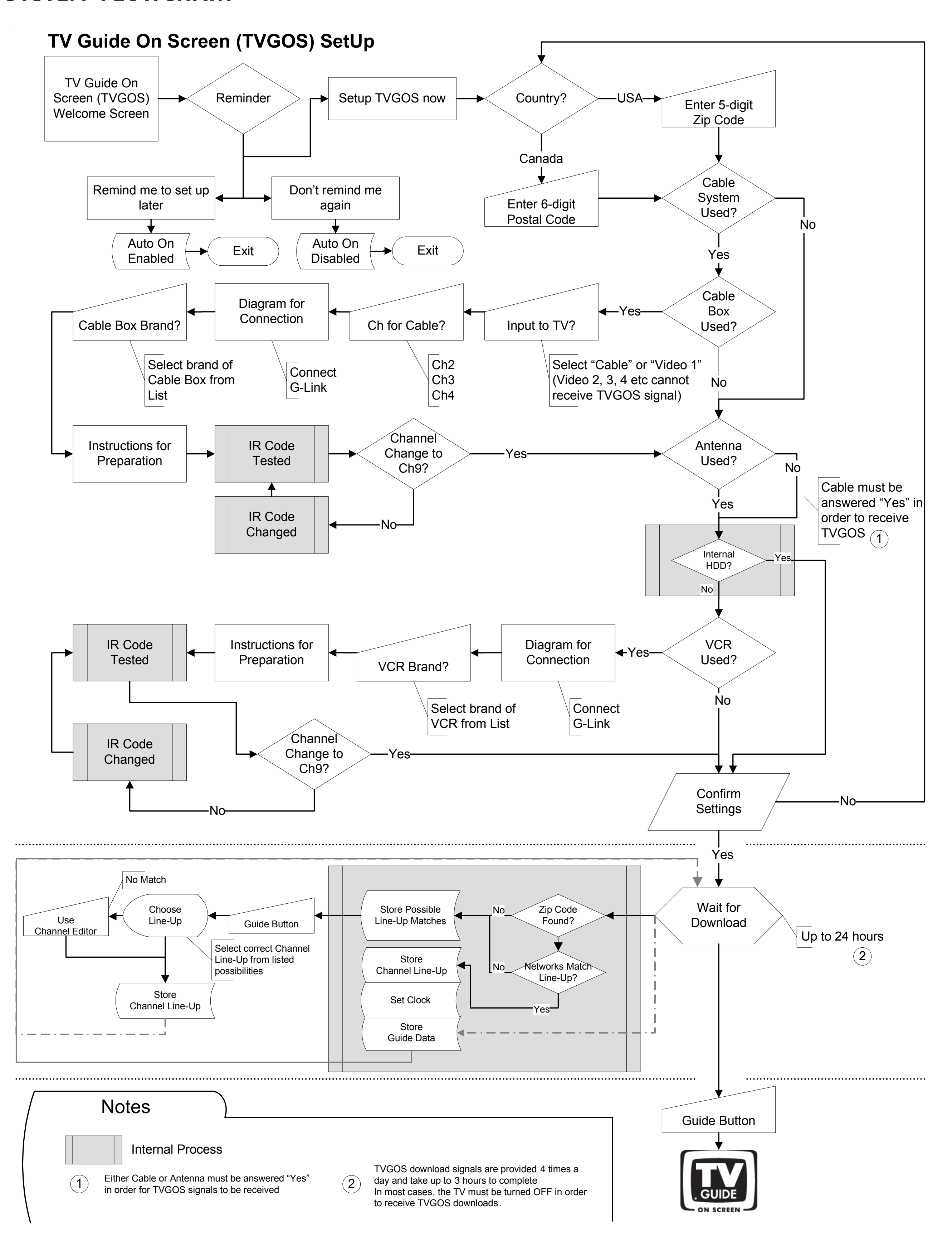


4/7/2006 19:52 [3] Section Reception-Slicing

| | Since Cold | HostChan | CurrChan |
|---|---|---|---|
| Starts | 188723 | 188723 | 10631 |
| Ends | 188539 | 188539 | 10611 |
| Drops | 43 | 43 | 1 |
| NoBufs | 0 | 0 | 0 |
| AOver | 0 | 0 | 0 |
| BadPMW | 0 | 0 | 0 |
| BadBuf | 0 | 0 | 0 |
| TypeA | 0 | 0 | 0 |
| ACorr | 0 | 0 | 0 |
| AErrs | 0 | 0 | 0 |
| TypeB | 139904 | 139904 | 8002 |
| BCorr | 27 | 27 | 2 |
| BErrs | 6 | 6 | 0 |
| COver | 0 | 0 | 0 |
| TypeC | 48617 | 48617 | 2609 |
| CCorr | 2 | 2 | 0 |
| CErrs | 0 | 0 | 0 |
| CBad | 166 | 166 | 17 |

Access this screen by using the up or down key and scroll Section Reception Slicing. This screen shows Type A, B, and C. Type A is not used in these units. You are only concerned with type B and C. Type B comes in on the vertical sync of you local ABC broadcast. Type C comes in on the vertical sync of your local PBS broadcast. The numerical values indicate the data sections the unit has received. If the value by type B or C is 0, this indicates either the channel reception is poor or there is a problem with the Gemstar equipment at that station. This equipment is not the responsibility of the station to maintain. Gemstar is responsible for their equipment. B CCorr indicates type B and C data corrections that have occured. Band CErrs indicates the errors in the data that has been received. CBad indicates the the bad data that has been confirmed only for type C.

## SYSTEM FLOWCHART




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